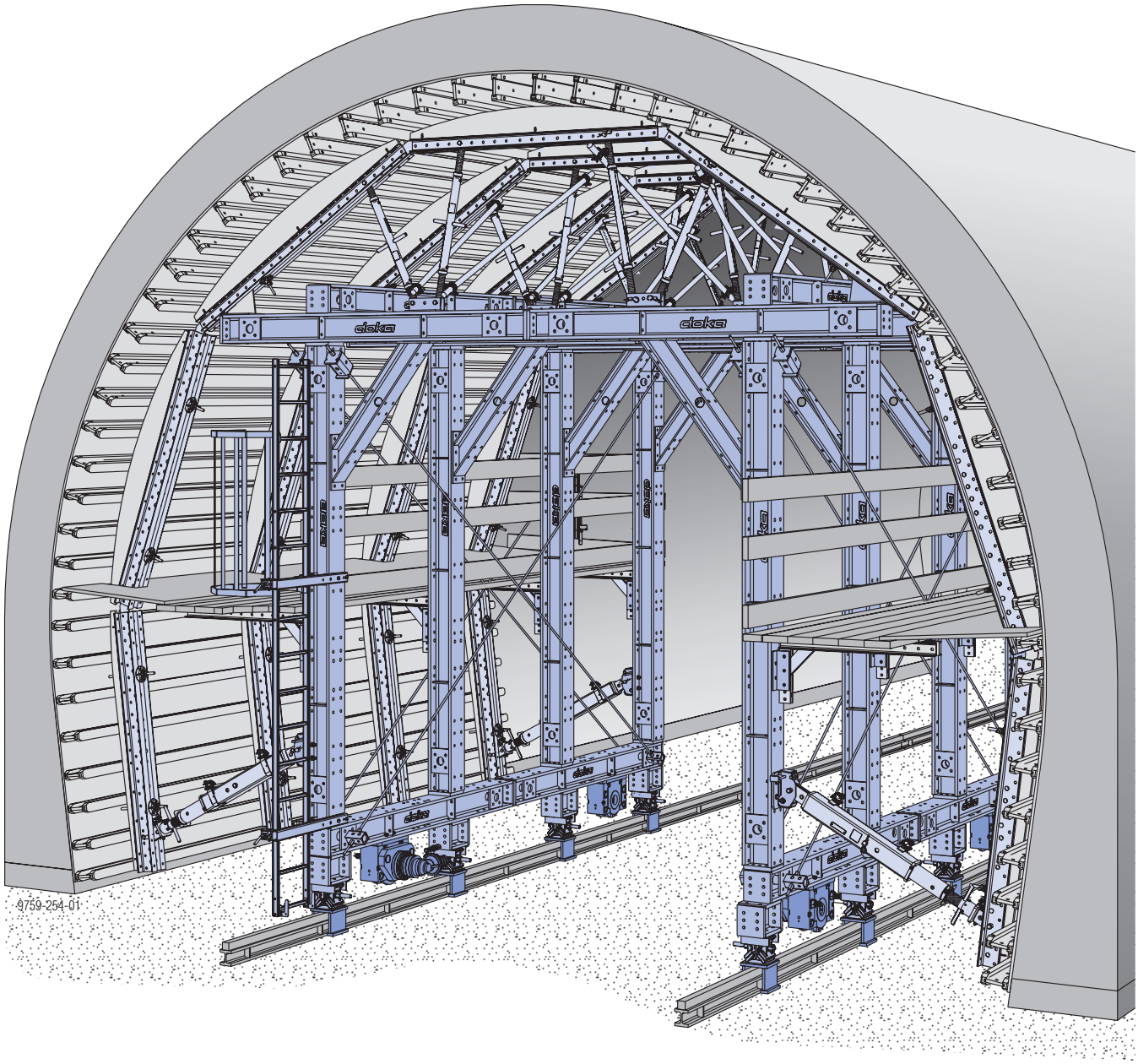
999759002 GB

Method statement

Doka heavy-duty supporting system SL-1



doka
The Formwork Experts

Contents Page

Elementary safety warnings

User target groups

- This User Information booklet (Method Statement) is aimed at everyone who will be working with the Doka product or system it describes. It contains information on how to set up this system, and on correct, compliant utilisation of the system.
- All persons working with the product described herein must be familiar with the contents of this manual and with all the safety instructions it contains.
- Persons who are incapable of reading and understanding this booklet, or who can do so only with difficulty, must be instructed and trained by the customer.
- The customer is to ensure that the information materials provided by Doka (e.g. User Information booklets, Instructions for Assembly and Use, Operating Instruction manuals, plans etc.) are available to all users, and that they have been made aware of them and have easy access to them at the usage location.

Remarks on this document

- This User Information booklet can also be used as a generic method statement or incorporated with a site-specific method statement.
- **Many of the illustrations in this booklet show the situation during formwork assembly and are therefore not always complete from the safety point of view.**
- **Further safety instructions, especially warnings, will be found in the individual sections of this document!**

Planning

- Provide safe workplaces for those using the formwork (e.g. for when it is being erected/dismantled, modified or repositioned etc). It must be possible to get to and from these workplaces via safe access routes!
- **If you are considering any deviation from the details and instructions given in this booklet, or any application which goes beyond those described in the booklet, then revised static calculations must be produced for checking, as well as supplementary assembly instructions.**

Rules applying during all phases of the assignment:

- The customer must ensure that this product is erected and dismantled, reset and generally used for its intended purpose under the direction and supervision of suitably skilled persons with the authority to issue instructions.
- Doka products are ONLY to be used in accordance with the Doka User Information booklets or other technical documentation provided by Doka.
- The stability of all components and units must be ensured during all phases of the construction work!
- The functional/technical instructions, safety warnings and loading data must all be strictly observed and complied with. Failure to do so can cause accidents and severe (even life-threatening) damage to health, as well as very great material damage.
- Fire-sources are not permitted anywhere near the formwork. Heating appliances are only allowed if properly and expertly used, and set up a safe distance away from the formwork.
- The work must take account of the weather conditions (e.g. risk of slippage). In extreme weather, steps must be taken in good time to safeguard the equipment, and the immediate vicinity of the equipment, and to protect employees.
- All connections must be checked regularly to ensure that they still fit properly and are functioning correctly.
  It is very important to check all screw-type connections and wedge-clamped joins whenever the construction operations require (particularly after exceptional events such as storms), and to tighten them if necessary.

Assembly

- The equipment/system must be inspected by the customer before use, to ensure that it is in suitable condition. Steps must be taken to rule out the use of any components that are damaged, deformed, or weakened due to wear, corrosion or rot.
- Combining our formwork systems with those of other manufacturers could be dangerous, risking damage to both health and property. If you intend to combine different systems, please contact Doka for advice first.
- The assembly work must be carried out by suitably qualified employees of the client's.

Erecting the formwork

- Doka products and systems must be set up in such a way that all loads acting upon them are safely transferred!

Pouring

- Do not exceed the permitted fresh-concrete pressures. Excessively high pouring rates lead to formwork overload, cause greater deflection and risk causing breakage.

Striking the formwork

- Do not strike the formwork until the concrete has reached sufficient strength and the person in charge has given the order for the formwork to be struck!
- When striking the formwork, never use the crane to break concrete cohesion. Use suitable tools such as timber wedges, special pry-bars or system features such as Framax stripping corners.
- When striking the formwork, do not endanger the stability of any part of the structure, or of any scaffolding, platforms or formwork that is still in place!

Transporting, stacking and storing

- Observe all regulations applying to the handling of formwork and scaffolding. In addition, the Doka slinging means must be used - this is a mandatory requirement.
- Remove any loose parts or fix them in place so that they cannot be dislodged or fall free!
- All components must be stored safely, following all the special Doka instructions given in the relevant sections of this User Information booklet!

Regulations; industrial safety

- Always observe all industrial safety regulations and other safety rules applying to the application and utilisation of our products in the country and/or region in which you are operating.

Instruction as required by EN 13374:

- If a person or object falls against, or into, the sideguard system and/or any of its accessories, the sideguard component affected may only continue in use after it has been inspected and passed by an expert.

Maintenance

- Only original Doka components may be used as spare parts.

Symbols used

The following symbols are used in this booklet:

Important note
Failure to observe this may lead to malfunction or damage.

Caution / warning / danger
Failure to observe this may lead to material damage, and to injury to health which may range up to the severe or even life-threatening.

Instruction
This symbol indicates that actions need to be taken by the user.

Sight-check
Indicates that you need to do a sight-check to make sure that necessary actions have been carried out.

Tip
Points out useful practical tips.

Reference
Refers to other documents and materials.

Miscellaneous

We reserve the right to make alterations in the interests of technical progress.

Unless otherwise stated, all dimensions are given in cm.

Eurocodes at Doka

In Europe, a uniform series of Standards known as **Eurocodes** (EC) was developed for the construction field by the end of 2007. These are intended to provide a uniform basis, valid throughout Europe, for product specifications, tenders and mathematical verification.

The EC are the world's most highly developed Standards in the construction field.

In the Doka Group, the EC are to be used as standard from the end of 2008. They will thus supersede the DIN norms as the "Doka standard" for product design.

The widely used "Permissible stress design" (comparing the actual stresses with the permissible stresses) has been superseded by a new safety concept in the EC.

The EC contrast the actions (loads) with the resistance (capacity). The previous safety factor in the permissible stresses is now divided into several partial factors. The safety level remains the same!

$$E_d \leq R_d$$

E_d **Design value of effect of actions**
(E ... effect; d ... design)
Internal forces from action F_d
(V_{Ed}, N_{Ed}, M_{Ed})

F_d **Design value of an action**
$F_d = \gamma_F \cdot F_k$
(F ... force)

F_k **Characteristic value of an action**
"actual load"
(k ... characteristic)
e.g. dead weight, live load, concrete pressure, wind

γ_F **Partial factor for actions**
(in terms of load; F ... force)
e.g. for dead weight, live load, concrete pressure, wind
Values from EN 12812

R_d **Design value of the resistance**
(R ... resistance; d ... design)
Design capacity of cross-section
(V_{Rd}, N_{Rd}, M_{Rd})

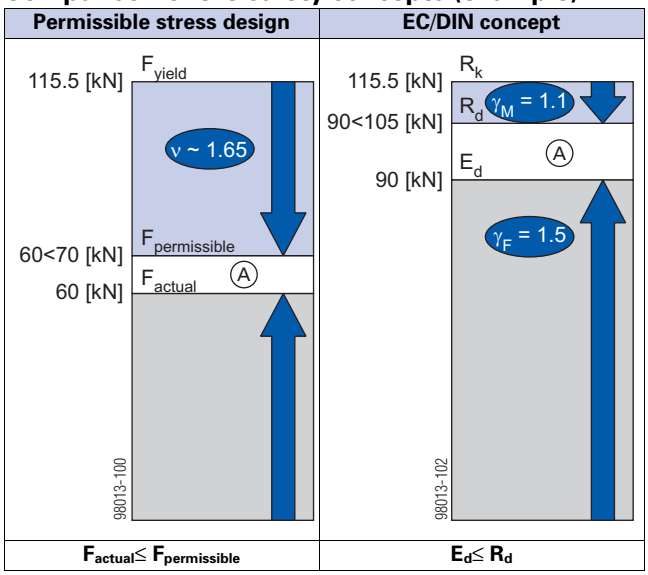
Steel: $R_d = \frac{R_k}{\gamma_M}$ Timber: $R_d = k_{mod} \cdot \frac{R_k}{\gamma_M}$

R_k **Characteristic value of the resistance**
e.g. moment resistance to yield stress

γ_M **Partial factor for a material property**
(in terms of material; M...material)
e.g. for steel or timber
Values from EN 12812

k_{mod} **Modification factor** (only for timber – to take account of the moisture and the duration of load action)
e.g. for Doka beam H20
Values as given in EN 1995-1-1 and EN 13377

Comparison of the safety concepts (example)



A Load factor

The "permissible values" communicated in Doka documents (e.g.: $Q_{permissible}$ = 70 kN) do not correspond to the design values (e.g.: V_{Rd} = 105 kN)!

- Avoid any confusion between the two!
- Our documents will continue to state the permissible values.

Allowance has been made for the following partial factors:
γ_F = 1.5
$\gamma_{M,\ timber}$ = 1.3
$\gamma_{M,\ steel}$ = 1.1
k_{mod} = 0.9

In this way, all the design values needed in an EC design calculation can be ascertained from the permissible values.

System description

Doka heavy-duty supporting system SL-1 - the versatile system for tunnel construction

The universal modular "kit" system of the Heavy-duty supporting system SL-1 consists of steel girders and heavy-duty props that adapt easily and efficiently to any shape and load. All system components are available for rent.

A versatile system with high load-bearing capacity

- small number of different parts
- quick to assemble (cuts costs)
- easy to brace using tie-rods (makes work easier inside the HD supporting units)
- compatible with other Doka systems
- entire system can be rented (permits highly economical solutions)

Can be used wherever there are high loads to be transferred

- cut-and-cover tunnels
- in short-term assignments on underground (bored) tunnels
- avalanche galleries and similar areas of use

Permitted loading of up to 420 kN per strut

- permits wide drive-through access openings
- ensures the very highest safety standards

Easy to reposition using hydraulic "Chain travelling unit"

- moves the heavy-duty supporting unit to its next location in just a few minutes
- requires only 1 man and a watchman for the repositioning operation
- means swift, safe repositioning in every phase of the work

The Heavy-duty supporting system SL-1 is mostly used in conjunction with components of the Large-area formwork Top 50, or of the Staxo and d2 load-bearing towers. For this reason, read and follow the User Information booklets for these systems as well.

Areas of use

Cut-and-cover tunnel construction

Underground tunnel construction

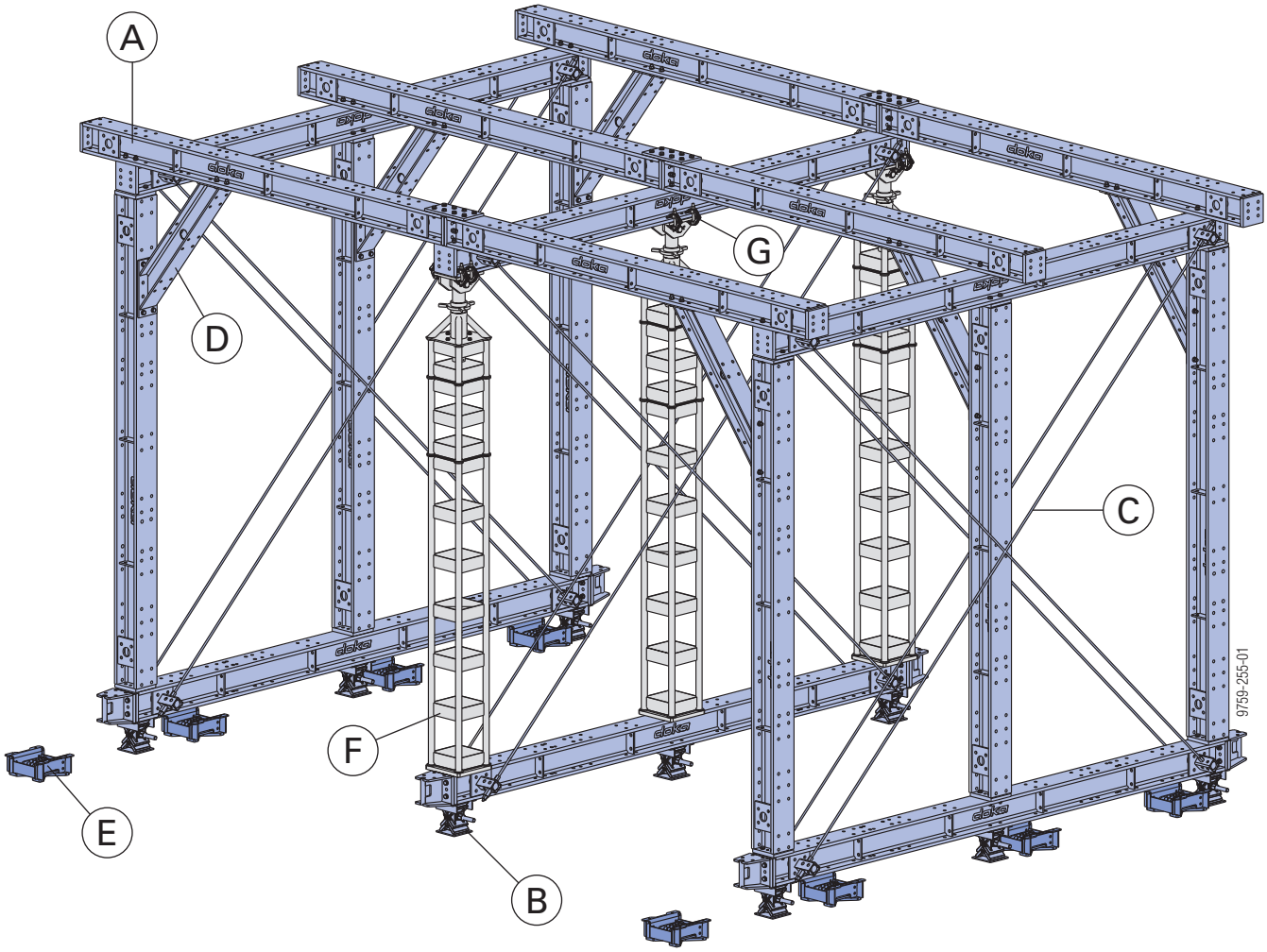
Underground tunnel construction under top cover

In bridge-building

Drive-through access openings beneath false-work

Custom constructions

System overview



A	Joints and dimensioning – System beams SL-1 (Page 16)
B	Lowering the heavy-duty supporting units (Page 38)
C	Tension-rod bracing (Page 25)
D	Bracing (Page 24)
E	Repositioning heavy-duty supporting units (Page 40)
F	Struts SL-1 (Page 48)
G	Clamping connections (Page 53)

Tunnel structures built using the cut-and-cover method

Tunnel formwork used in cut-and-cover construction should have large influence widths, only a small number of wall-ties, and be easy to reposition.

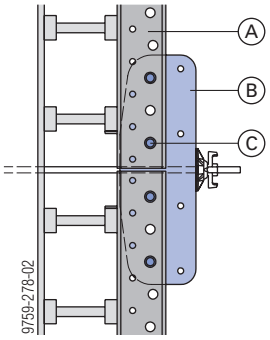
Required product features:

- high permitted loads
- ease of formwork operation
- minimal erection work

Waling system SL-1 T16

The special hole-grid on the Multi-purpose walings SL-1 WU16 gives them a high degree of versatility.

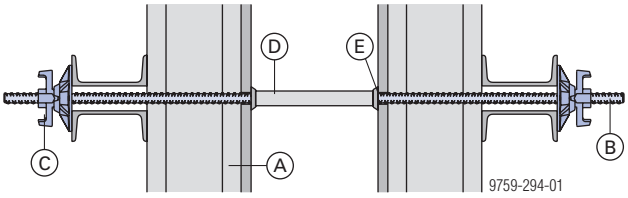
They can be used with Waling connectors SL-1 to make rentable, flexurally rigid joints in straight wall formwork.



A	Multi-purpose waling SL-1 WU16
B	Waling connector SL-1 WU16 0.75m
C	Connecting pin SL-1 D32 100 with Spring cotter 6mm

Form-tie system 20.0

The high load-bearing capacity of the Form-tie system 20.0 means that far fewer wall-ties are needed.

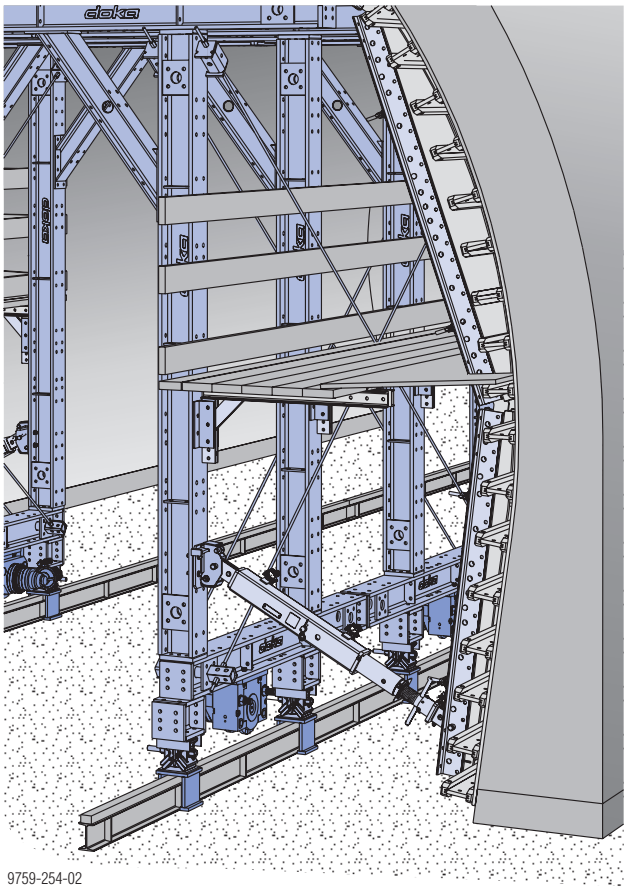


A	Top 50 element
B	Tie-rod 20.0
C	Super-plate 20.0 B
D	Plastic tube 26mm
E	Universal cone 26mm

Tie-rod 20.0mm:
Permitted capacity with safety factor of 1.6: 220 kN
Permitted capacity to DIN 18216: 150 kN

Operational steps after pouring

With a combination of the Lowering shoe SL-1 T16 and Spindle struts SL-1 T16, generous striking-distances can be obtained quickly, even on walls.



Striking formwork from walls

➤ Working from the ground, take out the bottom rows of form-ties.

➤ Take out the form-ties from the top rows of ties. These form-tie locations can be reached from the platforms.

➤ To take the load off the spindle struts, strike the wedge of the lowering shoe with a hammer.

➤ Pull the Fastening pins T16 out of the telescopic spindle struts.

➤ Retract the wall formwork by means of the hydraulic cylinder.

Lowering the heavy-duty supporting units

➤ See "Lowering the heavy-duty supporting units"

Repositioning the heavy-duty supporting units

➤ See "Repositioning using heavy-duty rollers" or "Repositioning using Chain travelling unit SL-1"

Tunnel structures built using underground construction methods

Particularly in the building of tunnels using underground construction methods, the formwork has to feature large lowering distances and leave as much space as possible for the site crew.

These special requirements are met by the combination of Multi-purpose walings SL-1 WU 16 and Spindle struts SL-1 T16.

Required product features:

- high permitted loads, meaning
  - large influence widths
  - small number of parallel frame sections / waling levels
  - ample space for the operators
- large lowering distance for easy cleaning
- easy-to-operate, hydraulically operated formwork
- minimal erection work

Operational steps after pouring

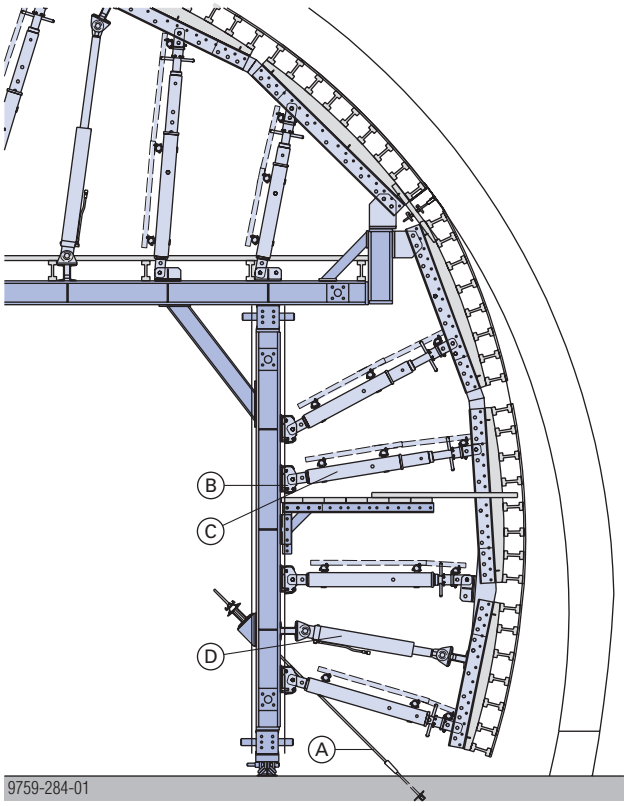
➤ Take out the ground anchors.

Striking formwork from walls

➤ To take the load off the spindle struts, strike the wedge of the lowering shoe with a hammer.

➤ Pull the Fastening pins T16 out of the telescopic spindle struts.

➤ Retract the wall formwork by means of the hydraulic cylinder.



A Ground anchor
B Lowering shoe SL-1
C Spindle strut SL-1 T16
D Hydraulic cylinder

Cleaning the tunnel-crown formwork

Lowering the heavy-duty supporting units

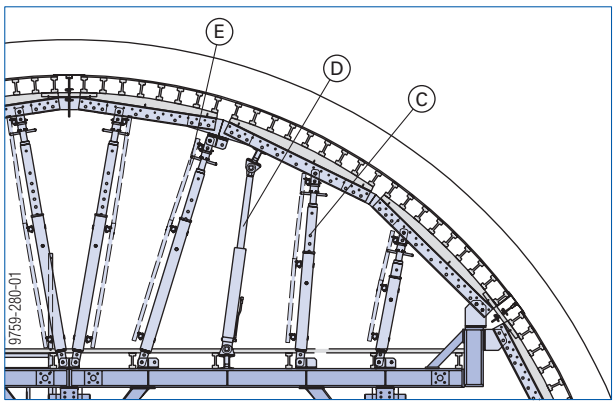
➤ See "Lowering the heavy-duty supporting units"

Folding down the tunnel formwork

➤ Depending on the arrangement of the superstructure, it may be necessary to detach the overhead diagonal bracing of the Spindle struts SL-1 T16.

Make sure that there is enough clearance for the diagonal bracing while it changes position.

➤ Raise the tunnel-crown formwork max. 5 mm by hydraulic cylinder.

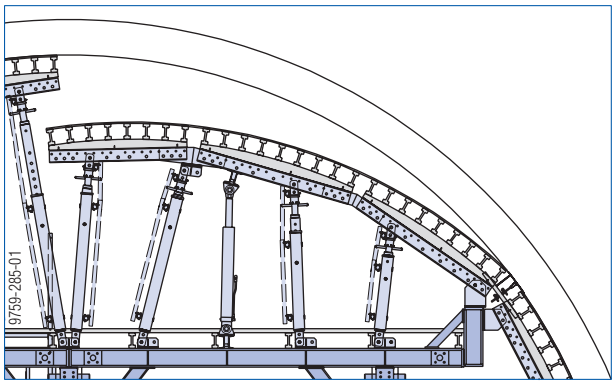


C Spindle strut SL-1 T16
D Special hydraulic cylinder with lowering brake valve
E Diagonal bracing

This takes the pressure off the spindle struts.

➤ Pull the Fastening pins T16 out of the telescopic spindle struts.

➤ Lower the formwork units by hydraulic cylinder, on alternate sides, and clean them.



Repositioning the heavy-duty supporting units

➤ See "Repositioning using heavy-duty rollers" or "Repositioning using Chain travelling unit SL-1"

Basic design of Heavy-duty supporting system SL-1

The procedures outlined below are based on the following basic types:

- Variant 1: Supporting frames with overhead longitudinal profiles
- Variant 2: Heavy-duty supporting unit with integral longitudinal profiles

As the Heavy-duty supporting system SL-1 is a universal modular system, it can also be combined to make supporting constructions that differ greatly from the two basic types described here.

➤ In these cases, you should discuss the assembly procedure with your Doka technician.

➤ Follow the shop drawing / assembly plan exactly.

➤ Read and observe any additional documents which may have been drawn up by Doka for the project in question.

A hard, flat, firm surface is needed!

Note:
The Tool box SL-1 contains a selection of tools specially chosen to help with assembly of this system.
A dynamometric wrench with a setting range of 150 - 200 Nm must be provided on-site.

All standardised joins are statically dimensioned as shear / bolt-bearing joins.

Warning!
Highly stressed threaded joints!
Risk of fracture if unsuitable screws are used.

➤ When joining SL-1 system components, ALWAYS use the appropriate Screw sets SL-1 only.

➤ Use NEW Screw sets SL-1 every time the equipment is re-assembled.

To prevent the joints working loose:

➤ Lubricate all bolts and nuts with WD40 spray.

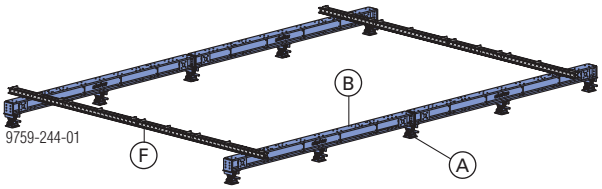
➤ Fit washers facing the head and the nut of each bolt.

➤ Tightening torque of the nuts: 150 Nm.

Variant 1: Heavy-duty supporting unit with overhead longitudinal profiles

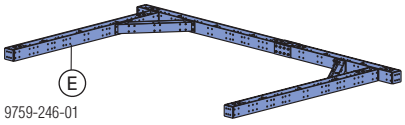
➤ Position the lowering wedges **(A)** as per the measurements given in the shop drawing. Allow for the lowering distance needed for lowering the heavy-duty supporting unit.

➤ Place the longitudinal system beams **(B)** onto the lowering wedges, and align them exactly.



Attach e.g. Multi-purpose walings WS10 Top50 **(F)** as distance pieces.

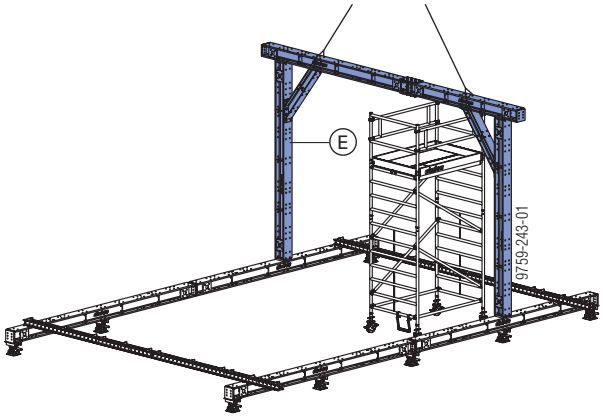
➤ Pre-assemble the supporting frame **(E)** flat on the ground.



Take care with high and short units!
If the first supporting frame is mounted on the end of the flat-placed system beams, it may topple over!

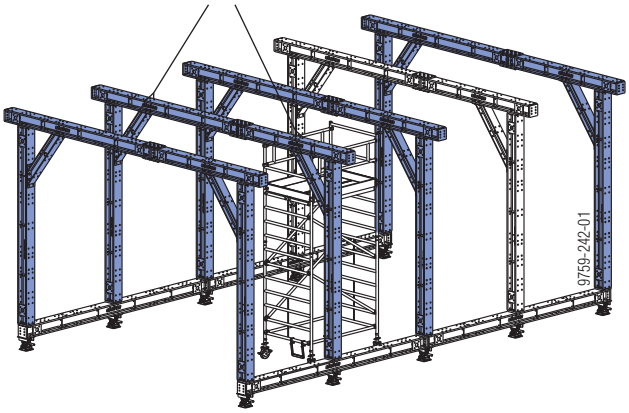
➤ Always mount the first supporting frame a suitable distance in from the end of the system beam.

➤ Crane-lift the supporting frame **(E)** into the upright and mount it onto the flat-placed system beams

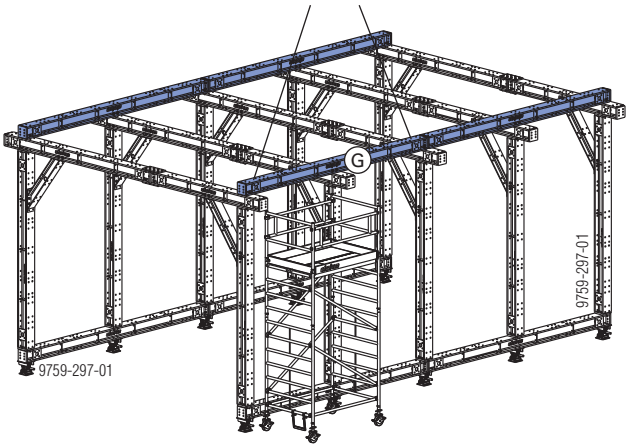


➤ Detach the supporting frame **(E)** from the crane tackle. Use a suitable service tower to reach the slinging points.

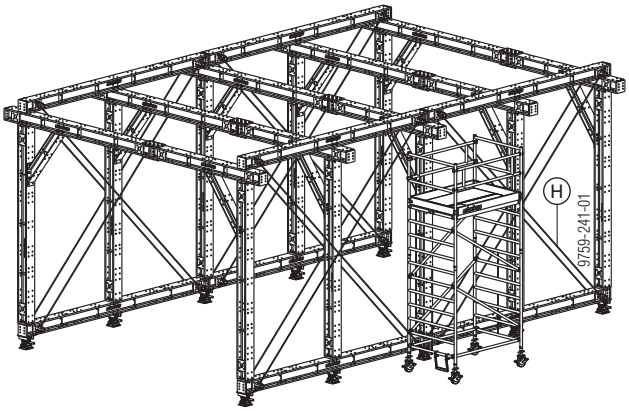
➤ Erect further supporting frames in the same way.



➤ Set down the overhead System beams **(G)** by crane, mount them to the supporting frames, and then detach them from the crane tackle. Provide a safe workplace that is suitable for carrying out this work (e.g. platforms or a platform trolley).



➤ Mount diagonal bracing. For details, see the section headed "Tension-rod bracing".



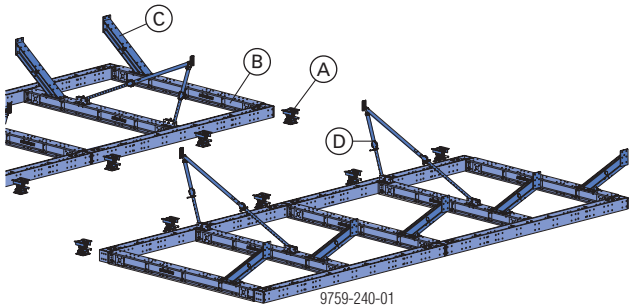
Note:
For more information on assembly, dismantling and the workflow, see the shop drawing / assembly plan.

Variant 2: HD supporting unit with integral longitudinal profiles

➤ Measure up the positions of the lowering wedges **(A)** as per shop drawing.
Allow for the lowering distance needed for lowering the heavy-duty supporting unit.

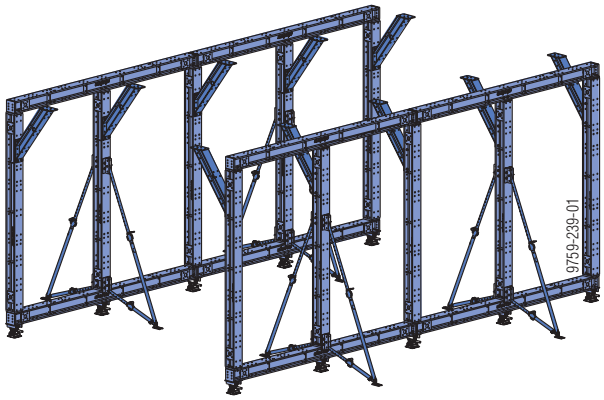
➤ Pre-assemble the side supporting frames **(B)** , incl. Knee-braces SL-1 **(C)** , at ground level.

➤ Attach panel struts **(D)** to help stand the frames upright.

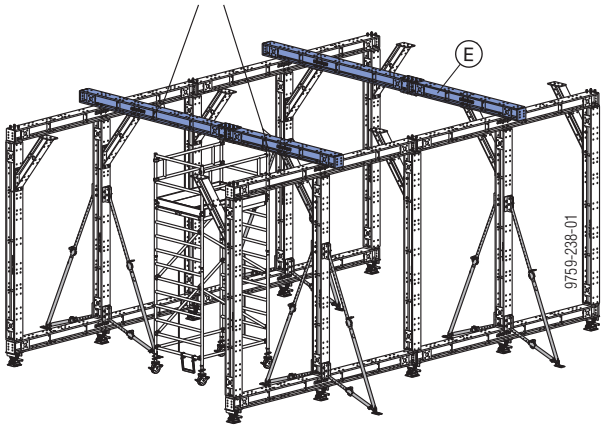


⚠
➤ Crane-lift the supporting frames into the upright, and fix the panel struts to the ground.

➤ Secure the HD supporting units so that they cannot topple over in either direction (e.g. by fixing extra panel struts on the opposite side, or anchoring each HD unit to the foundation).



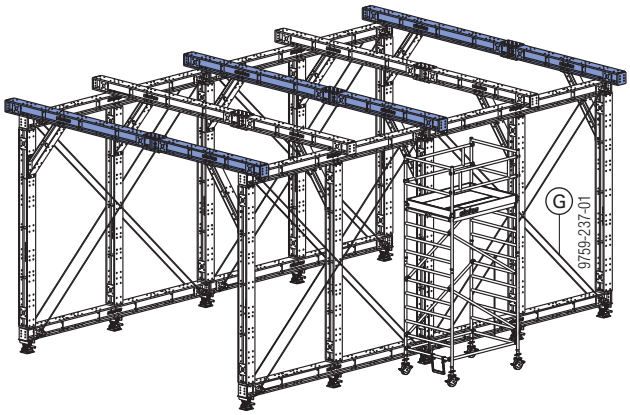
➤ Mount two system beams **(E)** as a cross connection at the top. Provide a safe workplace that is suitable for carrying out this work (e.g. platforms or a platform trolley).



The panel struts can now be removed.

➤ Mount further system beams in the same way.

➤ Mount diagonal bracing. For details, see the section headed "Tension-rod bracing".



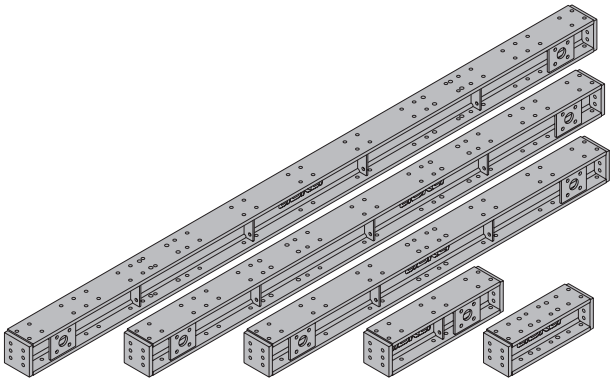
Note:
For more information on assembly, dismantling and the workflow, see the shop drawing / assembly plan.

Notes

Joints and dimensioning - System beams SL-1

The System beams SL-1 are modular, combinable steel girders from which universal heavy-duty supporting units can be assembled.

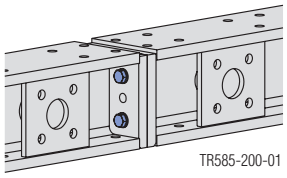
Overview of variants

System beams SL-1				
				
5.00m	4.00m	3.00m	1.00m	0.75m

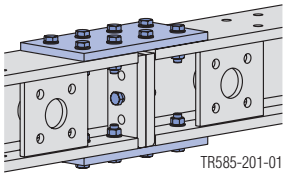
The Offset pin SL-1 makes it easier to align the drilled holes during assembly.

Standardised joints:

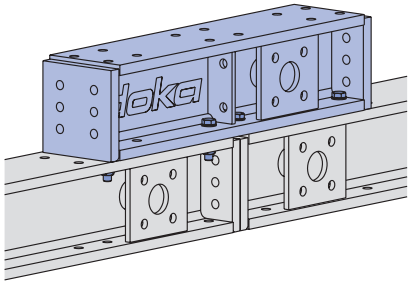
End-face join



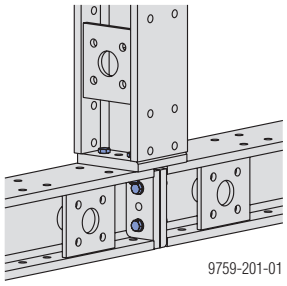
Butt-strap join



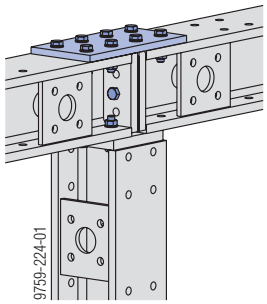
Beam join with stacking piece

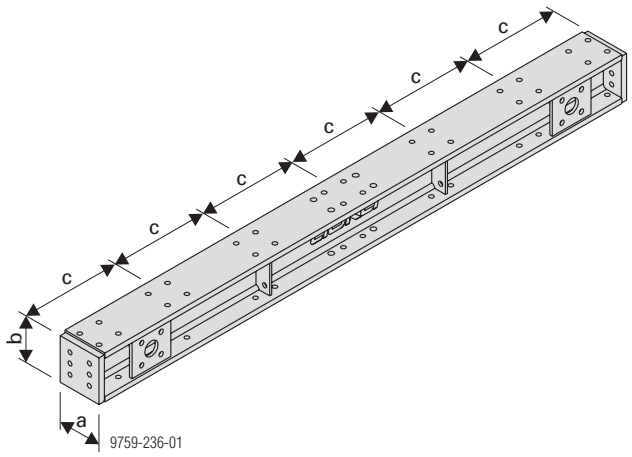


T-joint



T-joint with connecting plate

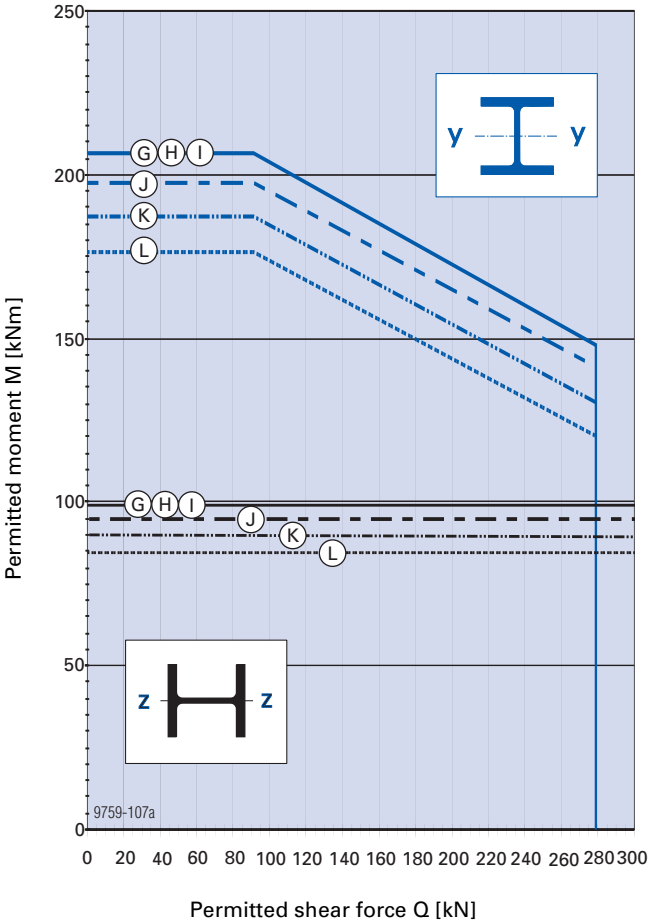




a ... 22.6 cm
b ...24.0 cm
c ... System increment-grid 50.0 cm

Technical data:
Section modulus: 1200 cm³
Moment of inertia: 14,600 cm⁴

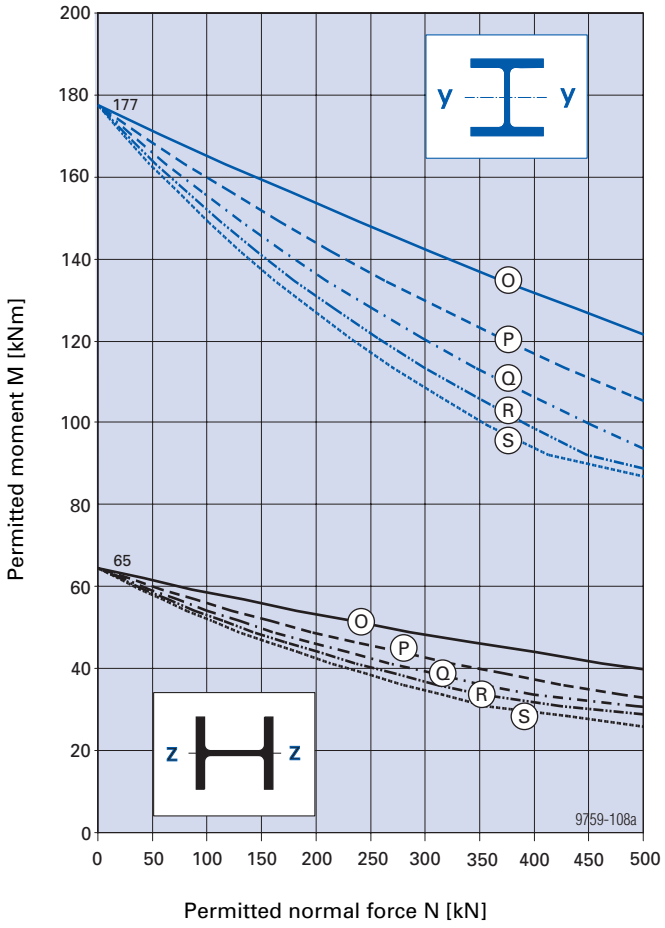
Permitted internal forces: System beam SL-1 not screw-jointed (without proof of stability - see buckling diagram for System beams SL-1)



G	N_f = 0 kN
H	N_f = 100 kN
I	N_f = 200 kN
J	N_f = 300 kN
K	N_f = 400 kN
L	N_f = 600 kN

N_f = actual normal force in the System beam SL-1

Buckling diagram: System beam SL-1 not screw-jointed



O	Effective length = 100 cm
P	Effective length = 200 cm
Q	Effective length = 300 cm
R	Effective length = 400 cm
S	Effective length = 500 cm

Joints between System beams SL-1

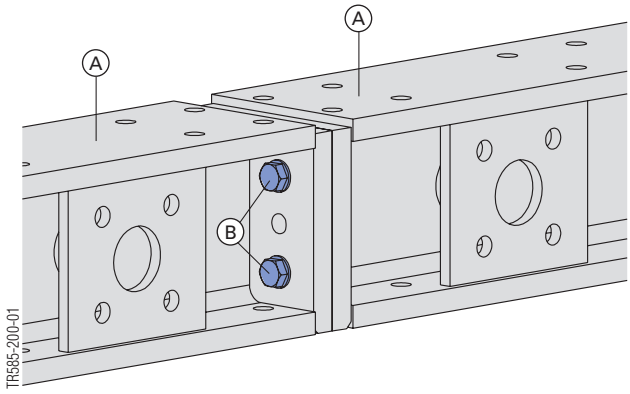
Preliminary remarks

All standardised joins are statically dimensioned as shear / bolt-bearing joins.

Warning!
Highly stressed threaded joints!
Risk of fracture if unsuitable screws are used.
- ➤ When joining SL-1 system components, ALWAYS use the appropriate Screw sets SL-1 only.
- ➤ Use NEW Screw sets SL-1 every time the equipment is re-assembled.

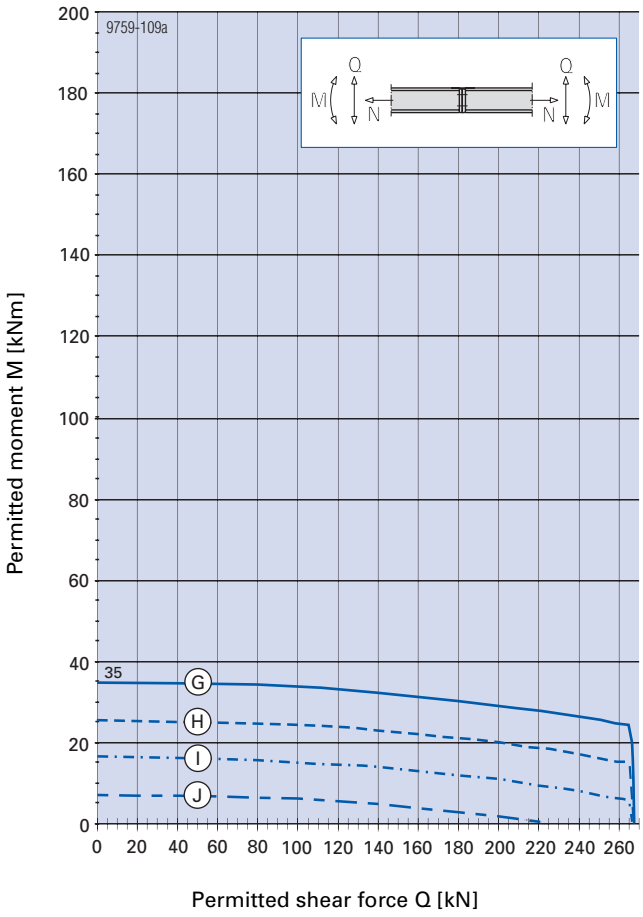
To prevent the joints working loose:
- ➤ Lubricate all bolts and nuts with WD40 spray.
- ➤ Fit washers facing the head and the nut of each bolt.
- ➤ Tightening torque of the nuts: 150 Nm.

End-face join



A System beam SL-1
B Screw-set M20x90 8.8 shank length 38mm

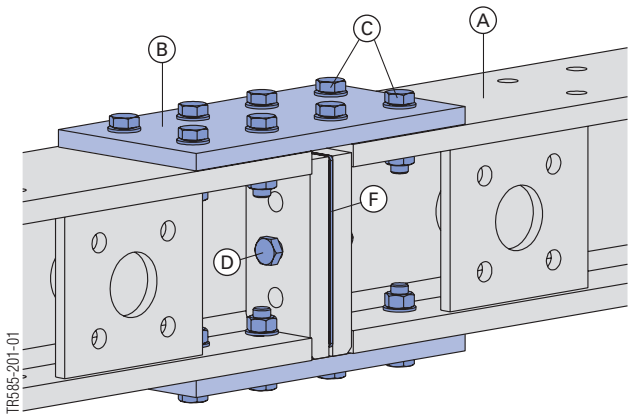
Permitted internal forces



G N_f = 0 kN
H N_f = 100 kN
I N_f = 200 kN
J N_f = 300 kN

N_f = actual normal force in the join

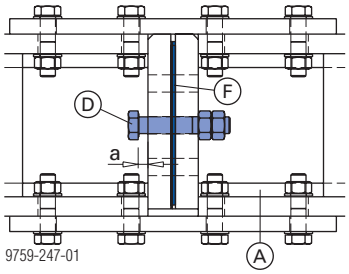
Butt-strap join



A	System beam SL-1
B	Connection splice plate SL-1
C	Screw set for Connection splice plate SL-1
D	2 hexagonal bolts M22x120 8.8 and 4 hexagon nuts M22 8 (included with Item C)
F	Packing plate SL-1

Important note:

- The screws **(D)** are only for transferring the shear force. Owing to the tolerances, they must be fitted with a play of a ... min. 5 mm. Secure the connection by countering with a second nut.



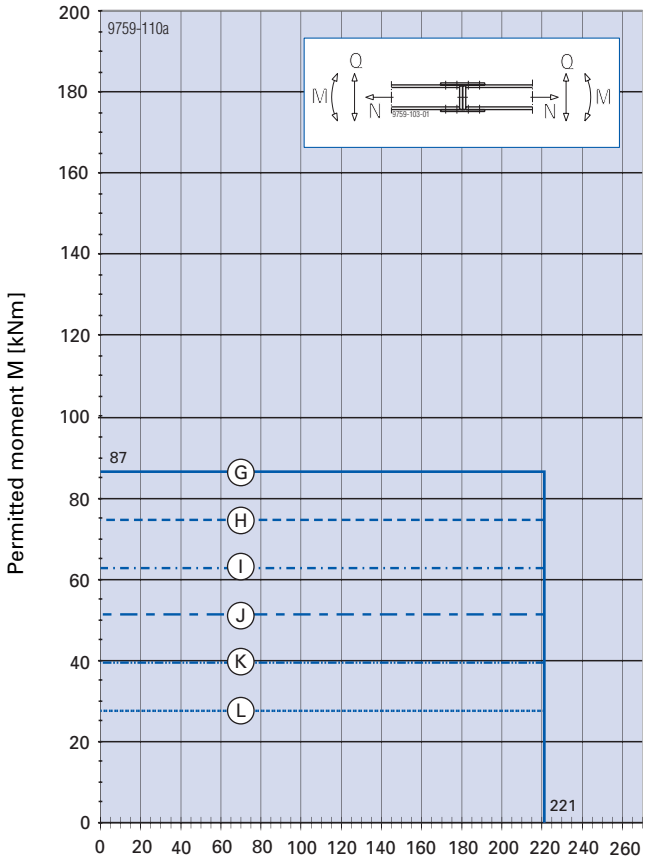
a ... min. 5 mm

- Under load, a gap of up to 5 mm and/or up to 2% buckling may occur between the screws and the drilled holes, due to production-related tolerances.

  These tolerances can be equalised by installing packing plates.
- Packing plates must be fitted wherever joins are subjected to bending stress.

By combining packing plates with thicknesses of 2, 3 and 4 mm, closures can be made in a 1 mm increment-grid.

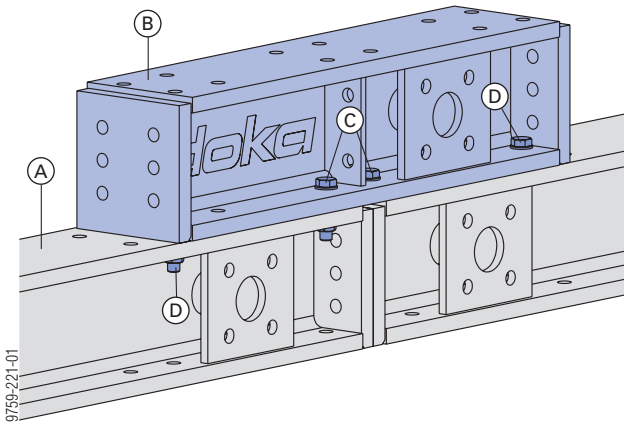
Permitted internal forces



G	N_f = 0 kN
H	N_f = 100 kN
I	N_f = 200 kN
J	N_f = 300 kN
K	N_f = 400 kN
L	N_f = 600 kN

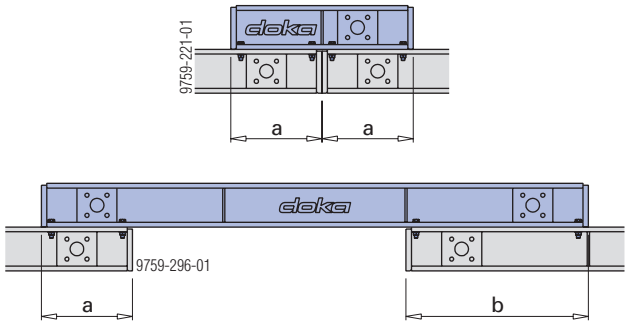
N_f = actual normal force in the join

Beam join with stacking piece



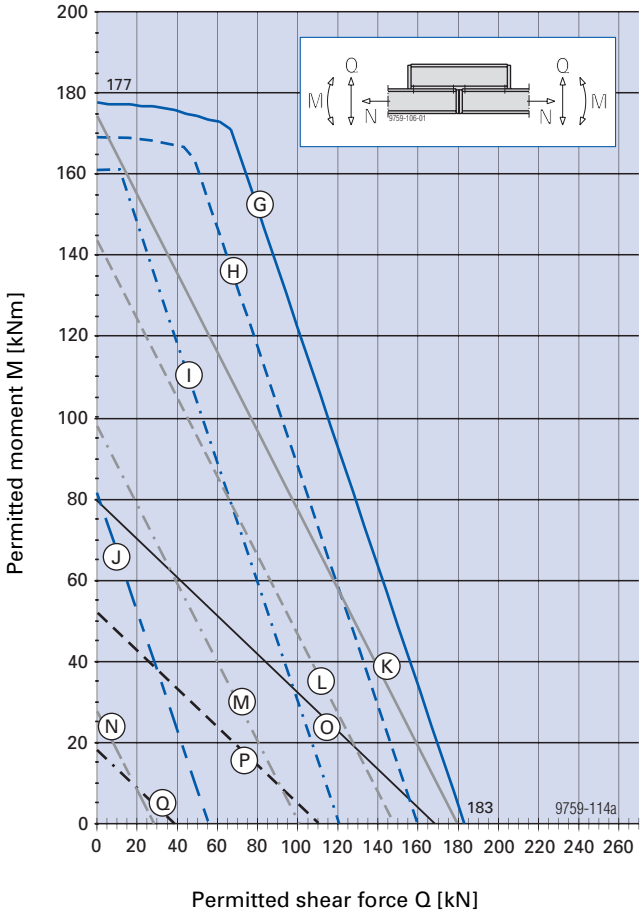
A	System beam SL-1
B	System beam SL-1
C	Screw-set M20x90 8.8, shank length 38mm, in the middle holes of Item B
D	Screw-set M20x90 8.8, shank length 38mm, in the end holes of Item B

Overlap



a ... Overlap 0.50 m
b ... Overlap 1.00 m

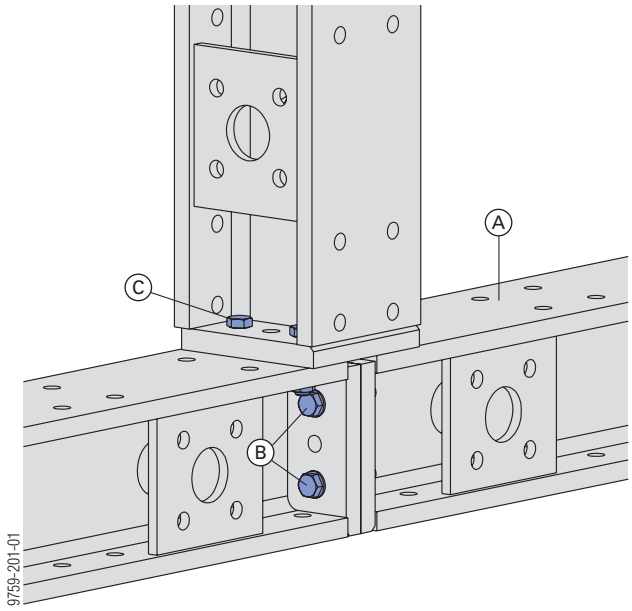
Permitted internal forces



G	N_f = 0 kN (overlap 1.50 m)
H	N_f = 100 kN (overlap 1.50 m)
I	N_f = 200 kN (overlap 1.50 m)
J	N_f = 300 kN (overlap 1.50 m)
K	N_f = 0 kN (overlap 1.00 m)
L	N_f = 100 kN (overlap 1.00 m)
M	N_f = 200 kN (overlap 1.00 m)
N	N_f = 300 kN (overlap 1.00 m)
O	N_f = 0 kN (overlap 0.50 m)
P	N_f = 100 kN (overlap 0.50 m)
Q	N_f = 200 kN (overlap 0.50 m)

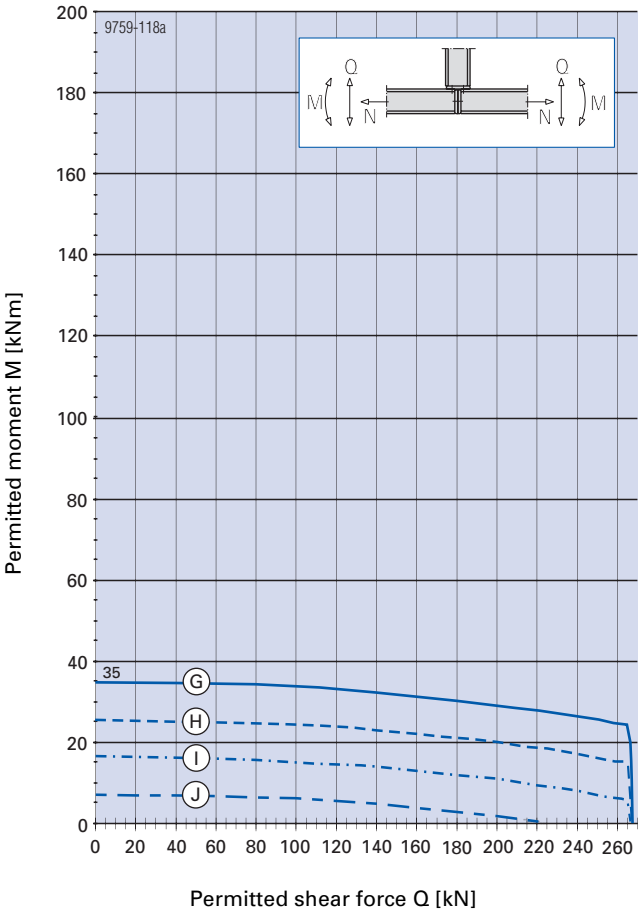
N_f = actual normal force in the join

T-joint



A	System beam SL-1
B	Screw-set M20x90 8.8 shank length 38mm
C	Screw set for Knee-brace SL-1 (1 set is sufficient for 2 T-joints)

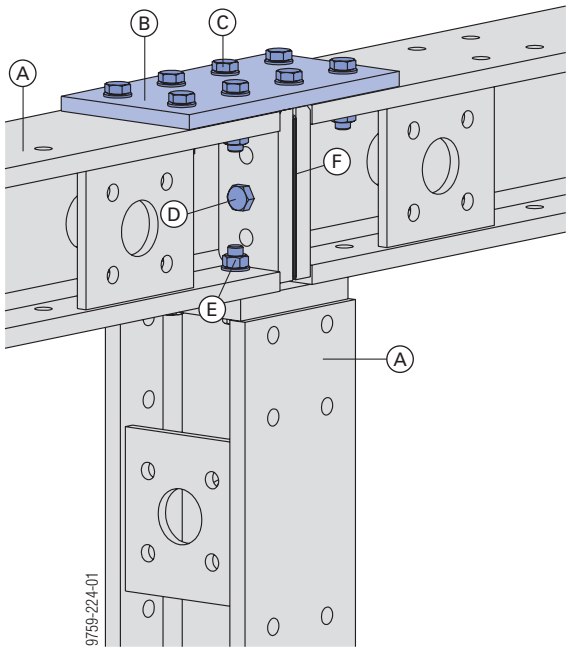
Permitted internal forces



G	N_f = 0 kN
H	N_f = 100 kN
I	N_f = 200 kN
J	N_f = 300 kN

N_f = actual normal force in the join

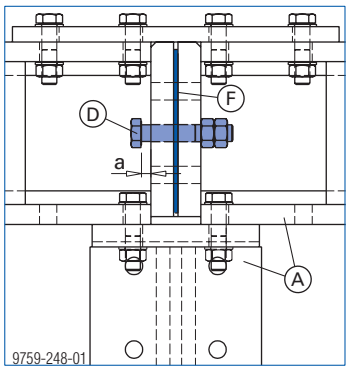
T-joint with connecting plate - loading case: "Vertical strut under pressure"



A	System beam SL-1
B	Connection splice plate SL-1
C	Screw set for Connection splice plate SL-1
D	2 hexagonal bolts M22x120 8.8 and 4 hexagon nuts M22 8 (included with Item C)
E	Screw-set M20x90 8.8 shank length 38mm
F	Packing plate SL-1

Important note:

- The screws **(D)** are only for transferring the shear force. Owing to the tolerances, they must be fitted with a play of a ... min. 5 mm. Secure the connection by countering with a second nut.



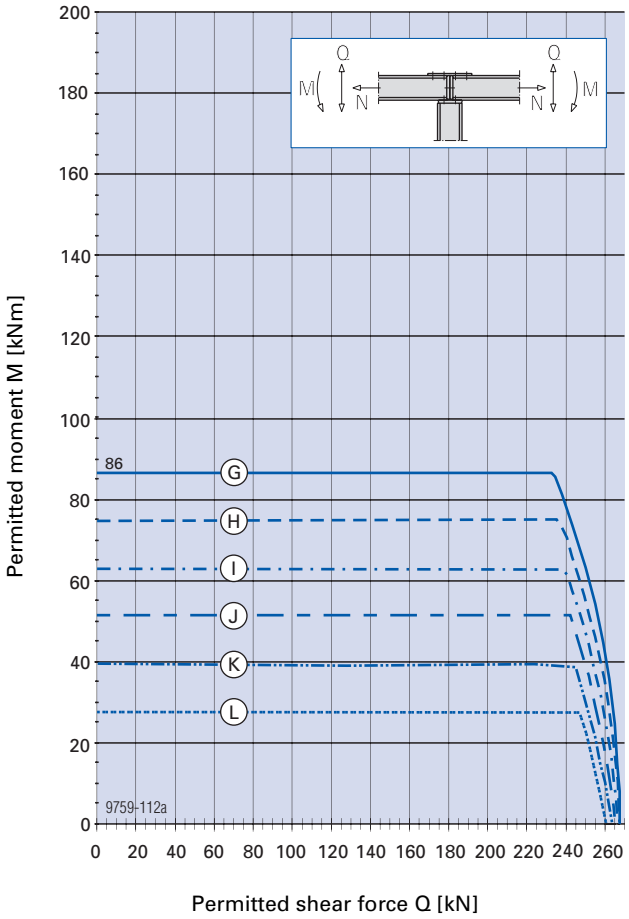
a ... min. 5 mm

- Under load, a gap of up to 5 mm and/or up to 2% buckling may occur between the screws and the drilled holes, due to production-related tolerances.

  These tolerances can be equalised by installing packing plates.
- Packing plates must be fitted wherever joins are subjected to bending stress.

By combining packing plates with thicknesses of 2, 3 and 4 mm, closures can be made in a 1 mm increment-grid.

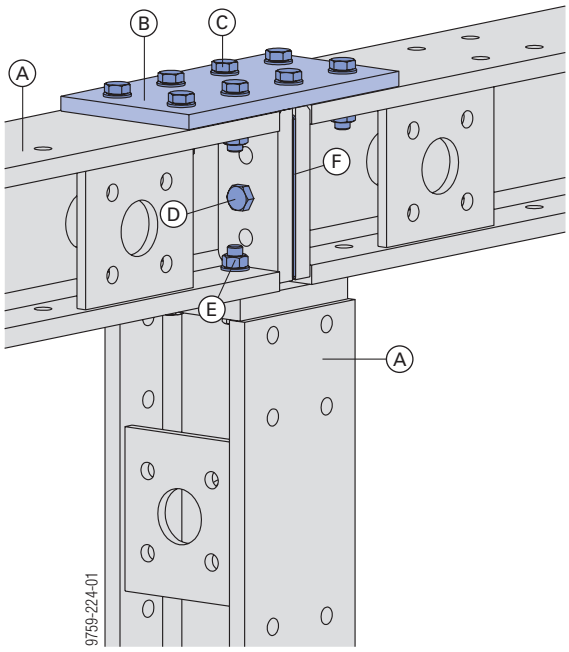
Permitted internal forces



G	N_f = 0 kN
H	N_f = 100 kN
I	N_f = 200 kN
J	N_f = 300 kN
K	N_f = 400 kN
L	N_f = 600 kN

N_f = actual normal force in the join

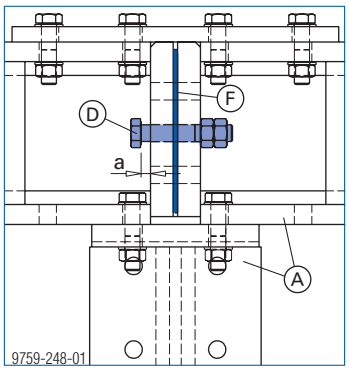
T-joint with connecting plate - loading case: "Vertical strut under tension"



A	System beam SL-1
B	Connection splice plate SL-1
C	Screw set for Connection splice plate SL-1
D	2 hexagonal bolts M22x120 8.8 and 4 hexagon nuts M22 8 (included with Item C)
E	Screw-set M20x90 8.8 shank length 38mm
F	Packing plate SL-1

Important note:

- The screws **(D)** are only for transferring the shear force. Owing to the tolerances, they must be fitted with a play of a ... min. 5 mm. Secure the connection by countering with a second nut.



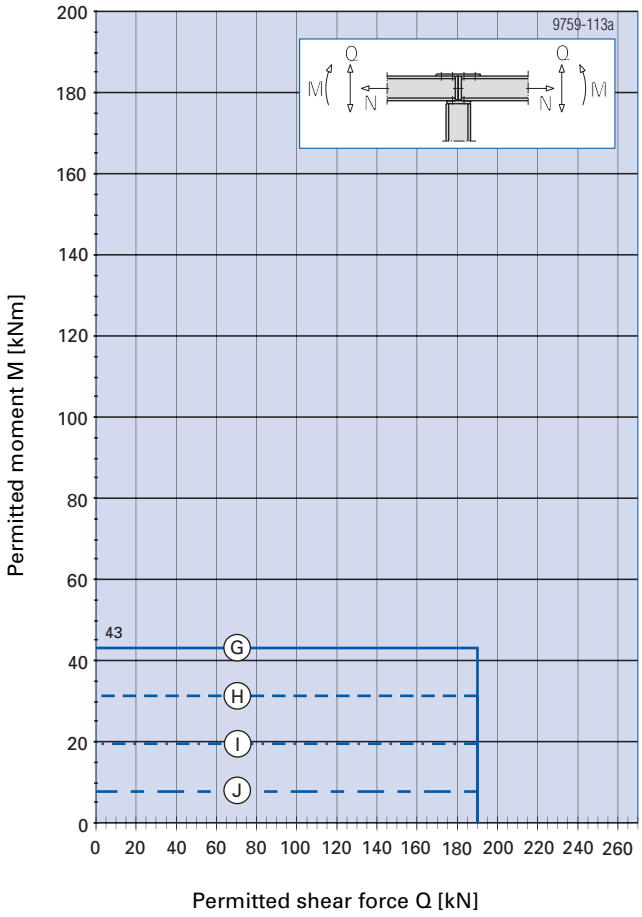
a ... min. 5 mm

- Under load, a gap of up to 5 mm and/or up to 2% buckling may occur between the screws and the drilled holes, due to production-related tolerances.

  These tolerances can be equalised by installing packing plates.
- Packing plates must be fitted wherever joins are subjected to bending stress.

By combining packing plates with thicknesses of 2, 3 and 4 mm, closures can be made in a 1 mm increment-grid.

Permitted internal forces



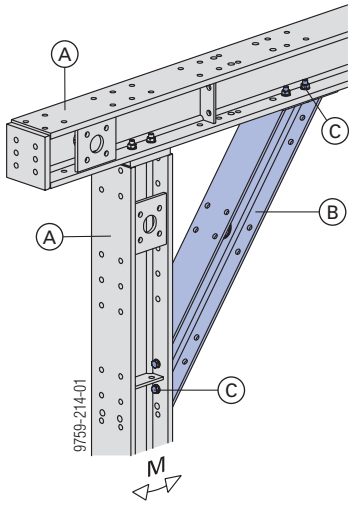
G	N_f = 0 kN
H	N_f = 100 kN
I	N_f = 200 kN
J	N_f = 300 kN

N_f = actual normal force in the join

Bracing

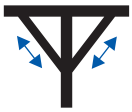
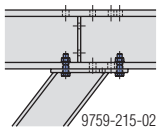
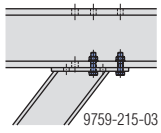
with Knee-brace SL-1

For making a flexurally rigid 90° joint between two System beams SL-1.



A	System beams SL-1
B	Knee-brace SL-1
C	Screw set for Knee-brace SL-1

Permitted load on knee-brace

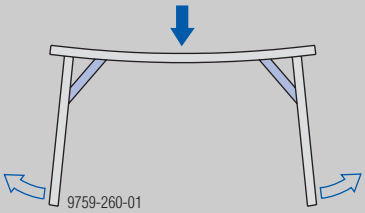
		A	B
			
Tension	Screws arranged symmetrically 	250 kN	300 kN
	Screws arranged unsymmetrically 	220 kN	220 kN
Pressure		250 kN	300 kN

Note on Column A:
The Knee-brace SL-1 connects to the System beam and transfers bending moments into it.

When calculating the design loads, allowance MUST be made for the bending moments M which occur in the system beams. (See "Joints and dimensioning - System beams SL-1")

Caution!

The bending moments transferred into the horizontal System beam SL-1 from the slab loads are then transferred through the knee-brace into the vertical beams.



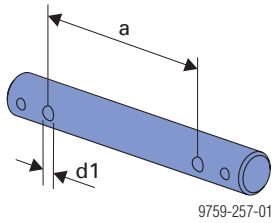
➤ Counter-measures: e.g. Tensioning together the vertical beams with tie-rods, or positioning braces with outward-facing spindle struts against existing walls.

Tension-rod bracing

using Bracing bolt SL-1 and Distance piece SL-1

Tension-rod bracing to the inside holes of the Bracing bolt

The standard tension-rod brace on HD supporting units assembled from System beams SL-1.

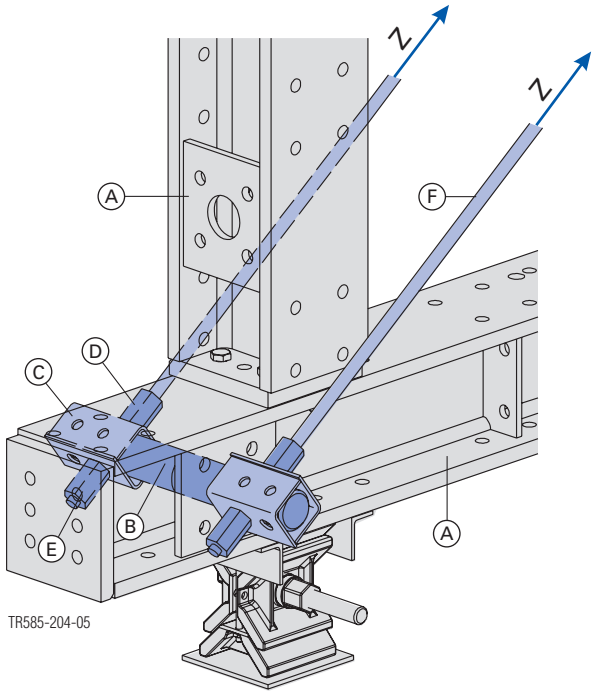


a ... 330 mm
d1 ... diameter 24 mm (for Tie-rods 15.0 and 20.0mm)

Tension-rod brace using Tie-rod 20.0: $Z_{perm.}$ = 140 kN

Tension-rod brace using Tie-rod 15.0: $Z_{perm.}$ = 90 kN to DIN 18216,
120 kN, allowing a 1.6 : 1 factor of safety against failure

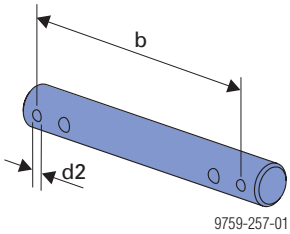
Centre the Bracing bolt SL-1 with the Distance pieces SL-1!



A	System beams SL-1
B	Bracing bolt SL-1
C	Distance piece SL-1
D	Hexagon nut 15.0 or 20.0
E	Split nut SL-1 15.0 or Hexagon nut 20.0
F	Tie-rod 15.0 or 20.0

Tension-rod bracing to the outside holes of the Bracing bolt

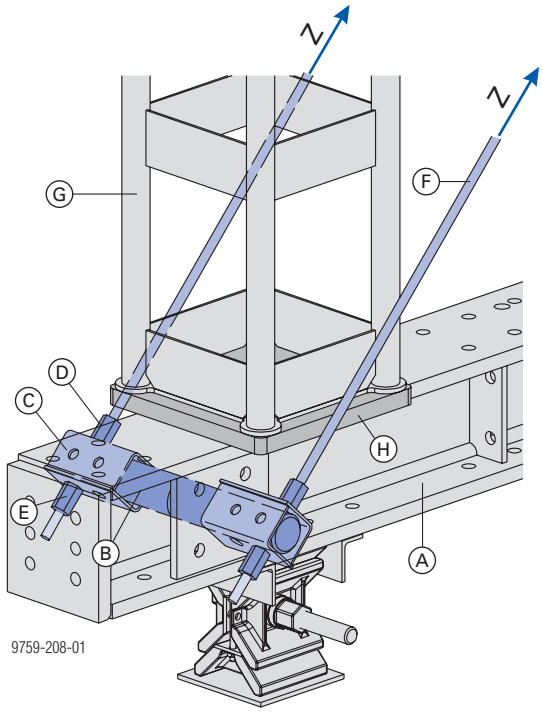
SL-1 struts are wider than the System beams. For this reason, if vertical Struts SL-1 are being used, the tension-rod brace can only be fastened in the outside holes.



b ... 450 mm
d2 ... diameter 19 mm (only for Tie-rods 15.0mm)

Tension-rod brace using Tie-rod 15.0: $Z_{perm.}$ = 80 kN

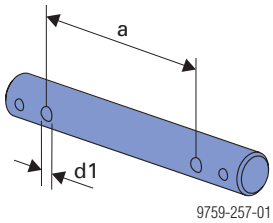
Centre the Bracing bolt SL-1 with the Distance pieces SL-1!



A	System beam SL-1
B	Bracing bolt SL-1
C	Distance piece SL-1
D	Hexagon nut 15.0
E	Split nut SL-1 15.0 or Hexagon nut 15.0
F	Tie-rod 15.0
G	Strut SL-1
H	Basic plate SL-1

using Bracing bolt SL-1 and Brace stirrup SL-1

Tension-rod bracing is only permitted to the inside holes "a", as otherwise it would not be possible to centre the Bracing bolt!



a ... 330 mm
d1 ... diameter 24 mm (for Tie-rods 15.0 and 20.0mm)

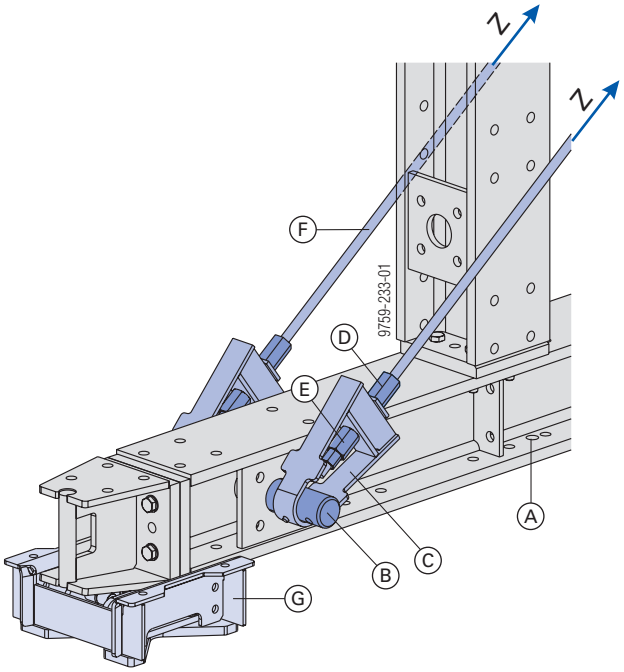
This type of tension-rod brace is mainly used in cases where the HD supporting units are travelled on Heavy duty roller gear SL-1.

The Brace stirrup SL-1 is designed so that the tie-rods do not protrude down beyond the Bracing bolt.

This means that when the unit is travelled, there is no risk of any tie-rods colliding with the "Guidances for heavy duty roller gear SL-1".

Tension-rod brace using Tie-rod 20.0: $Z_{perm.}$ = 140 kN

Tension-rod brace using Tie-rod 15.0: $Z_{perm.}$ = 90 kN



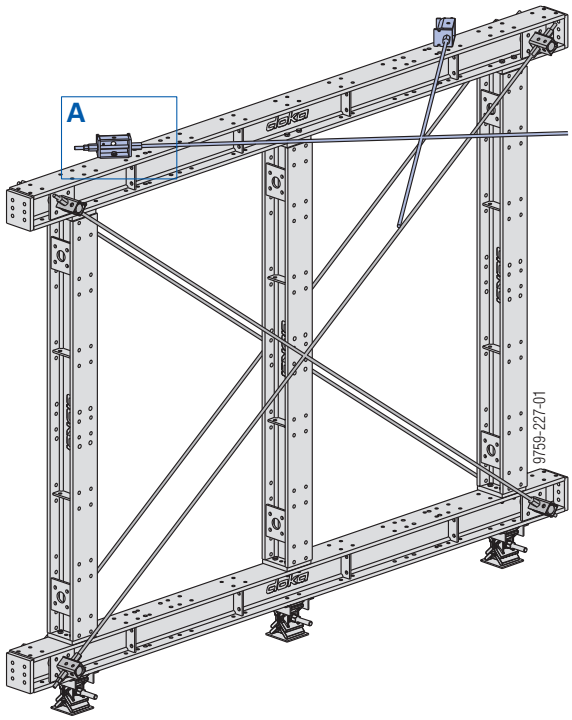
A	System beam SL-1
B	Bracing bolt SL-1
C	Brace stirrup SL-1
D	Hexagon nut 15.0 or 20.0
E	Split nut SL-1 15.0 or Hexagon nut 20.0
F	Tie-rod 15.0 or 20.0
G	Guidance for heavy duty roller gear SL-1 with Heavy duty roller gear SL-1

using Fixing bracket SL-1

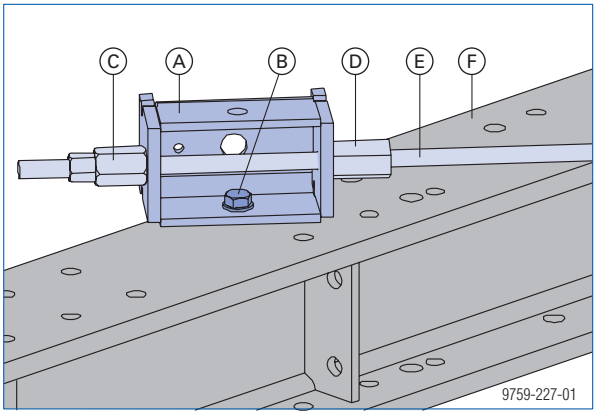
Variant 1

- for bracing SL-1 constructions with Tie-rods 15.0. Can be mounted in 50 cm increments.

Permitted tensile force: 56 kN



Close-up A:



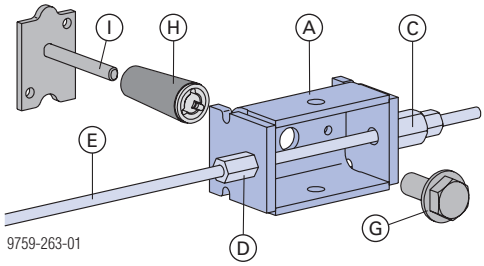
A	Fixing bracket SL-1
B	Screw set for Fixing bracket SL-1
C	Split nut SL-1 15.0 or Hexagon nut 15.0
D	Hexagon nut 15.0
E	Tie-rod 15.0
F	System beam SL-1

Variant 2

- for tension-rod bracing SL-1 constructions into finished casting sections.

Permitted tensile force: 50 kN

Close-up showing how fixed in concrete:



A	Fixing bracket SL-1
C	Split nut SL-1 15.0 or Hexagon nut 15.0
D	Hexagon nut 15.0
E	Tie-rod 15.0
G	Cone screw B 7cm
H	Universal climbing cone 15.0 with Sealing sleeve K 15.0
I	Stop-anchor 15.0 16cm

For details of the correct procedure for preparing the anchorage in the concrete, see the "Doka climbing formwork MF" Instructions for Assembly and Use.

Pre-tensioning the tie-rods

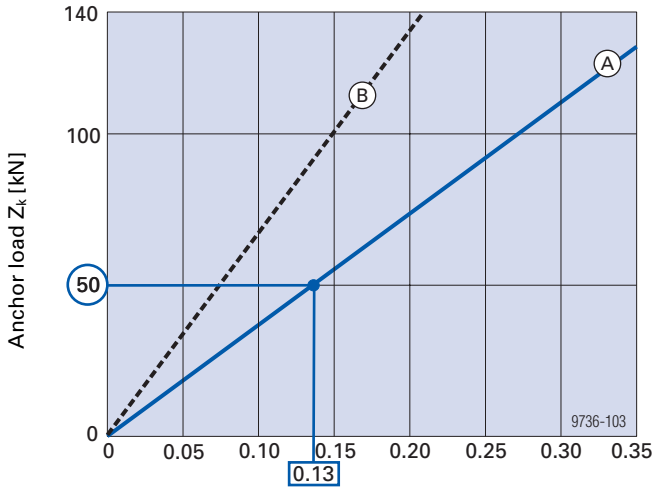
using the Split nut SL-1 15.0

Caution!
with all pre-tensioning methods - risk of fracture from one-sided loading and over-loading!

- ➤ **Pre-tensioning** and **loosening** should always be done alternately - approx. 1 turn per nut.
- ➤ The tensioning distances (required tensioning force) will be decided by the Doka statics departments alone.

In the statical calculation, allow for the pre-tensioning condition as a separate loading case!

Elongation of the form-ties as a percentage of the length of rod under load



Elongation of the length of rod under load [%]

A Tie-rod 15.0
B Tie-rod 20.0

Example:

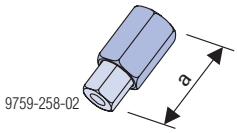
- Anchor load Z_k: 50 kN
- Tie-rod 15.0; Length: 6 m

➤ In the diagram, find out the tie-rod elongation for a value of 50 kN with reference to Line (A) (Tie-rod 15.0). In our example, this is approx. 0.13%.

➤ 0.13% of a form-tie length of 6 m (6000 mm) corresponds to a **tensioning distance of approx. 8 mm**.

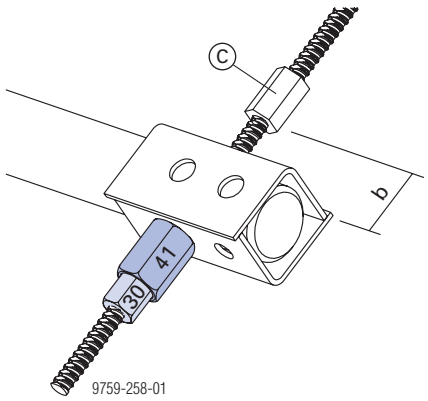
Pre-tensioning procedure:

➤ Screw the Split nut SL-1 together completely, by hand.
Overall length a = 90 mm

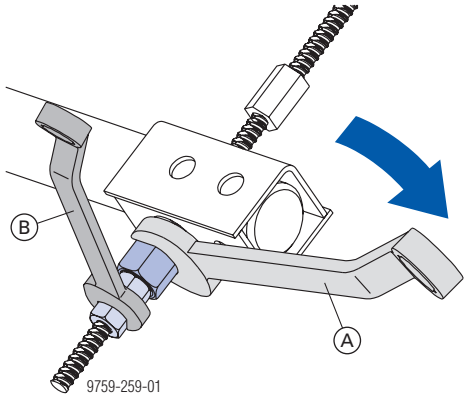


➤ Screw the Split nut B onto the Tie-rod 15.0 by hand.

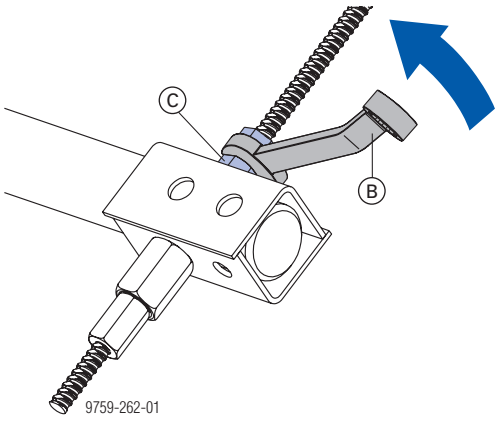
➤ Set the distance b=calculated tensioning distance + the 20 mm of the Hexagon nut 15.0 **(C)** .



➤ Tighten the split nut with a n° 41 combination wrench **(A)** so as to tension the tie-rod. When doing this, hold the inside of the split nut with a n° 30 combination wrench **(B)** to prevent it turning.
1 rotation = 1.5 mm
Tensioning distance max. 20 mm



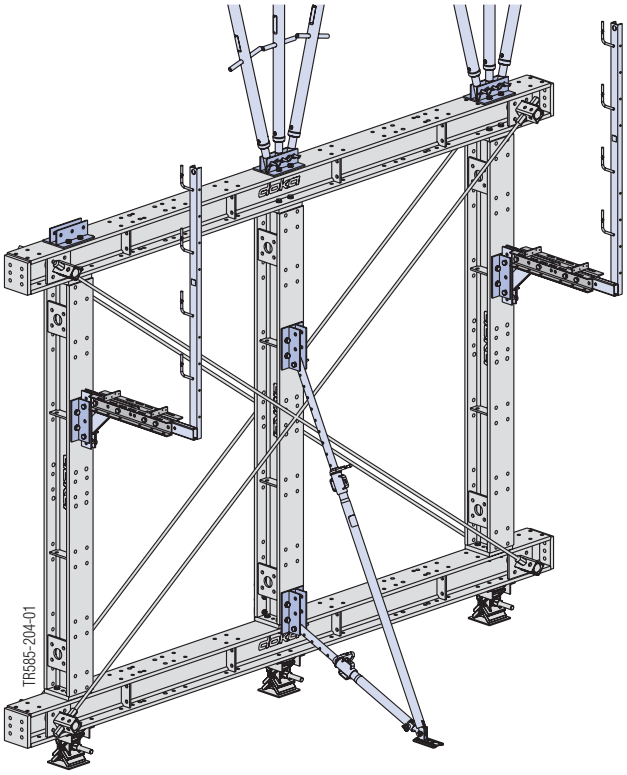
➤ Tighten the Hexagon nut 15.0 **(C)** with the Combination wrench 30 **(B)** .



Notes

Connecting up Top 50 components

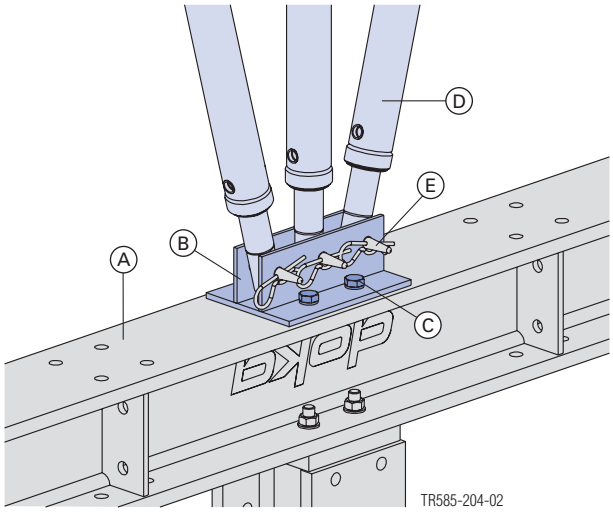
The Strut connection SL-1 is fastened onto the System beam SL-1 and is used for connecting up components from the Doka large-area formwork Top50 (e.g. spindle struts, panel struts, connecting plates etc.)



Connecting up spindle struts

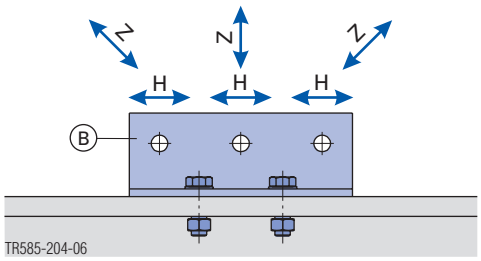
Important note:

- Arrange the spindle struts as symmetrically as possible!
- Do not exceed the carrying capacity of the spindle struts!



A	System beam SL-1
B	Strut connection SL-1
C	Screw-set M20x65 DIN 931 8.8
D	Spindle strut
E	Connecting pin 10 cm with spring cotter 6mm

Permitted internal forces



Clear gap for fitted components: 52 mm

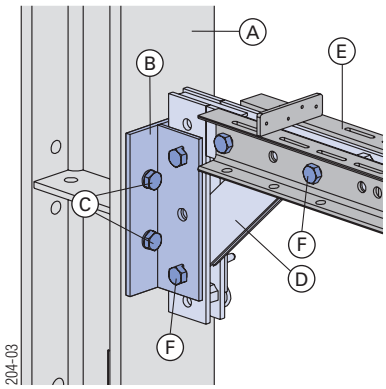
B	Strut connection SL-1

Z ... Permitted tensile/compressive forces ≤ 70 kN
Sum of all horizontal forces $H_{perm.}$ ≤ 160 kN

Connecting up platforms

e.g. with Corner connecting plates and multipurpose walings.

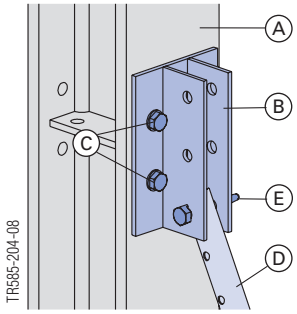
Permitted moment of the Corner connecting plate: 6 kNm



A	System beam SL-1
B	Strut connection SL-1
C	Screw-set M20x65 DIN 931 8.8
D	Corner connecting plate 90/50
E	Multi-purpose waling or Steel waling WS10
F	Connecting pin 10 cm with spring cotter 6mm

Connecting up panel struts

for plumbing and aligning the heavy-duty supporting units during assembly, and holding them in place stably.



A	System beam SL-1
B	Strut connection SL-1
C	Screw-set M20x65 DIN 931 8.8
D	Panel strut 340 or 540 without prop head
E	Connecting pin 10 cm with spring cotter 6mm

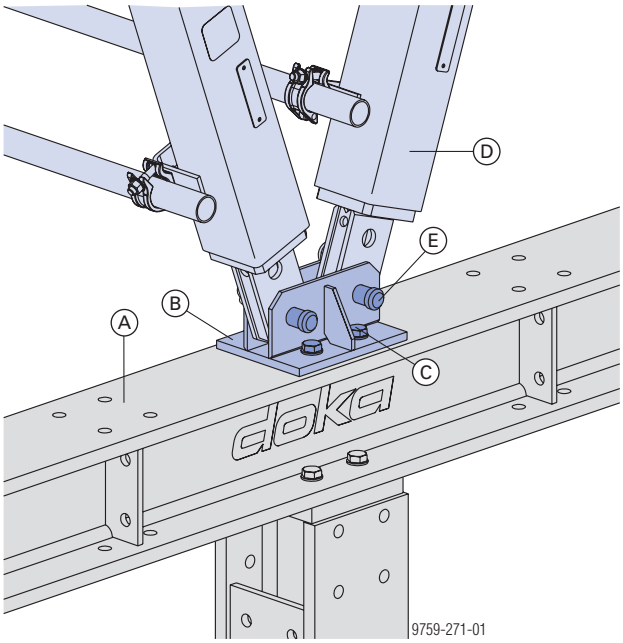
Connecting up Spindle struts SL-1 T16

The connectors are attached to the System beam SL-1 using the Screw set for Knee-brace SL-1.

Strut connection SL-1 T16

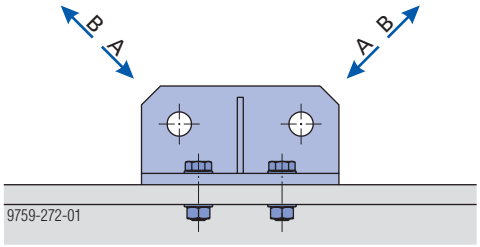
Important note:

- Arrange the spindle struts as symmetrically as possible!
- Make sure that the max. permitted load on the knee-brace is not exceeded when forces are transferred into the heavy-duty supporting units.



A	System beam SL-1
B	Strut connection SL-1 T16
C	Screw set for Knee-brace SL-1
D	Spindle strut SL-1 T16
E	Connecting pin SL-1 D32 100 with Spring cotter 6mm

Permitted internal forces

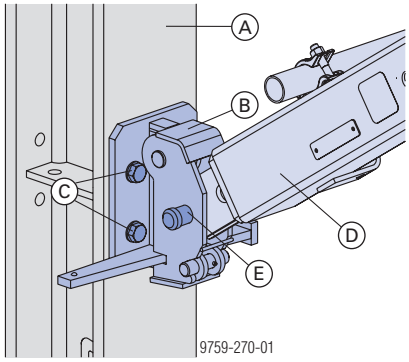


Clear gap for fitted components: 52 mm

A ... Permitted tensile/compressive forces ≤ 160 kN
B ... Permitted tensile force ≤ 115 kN

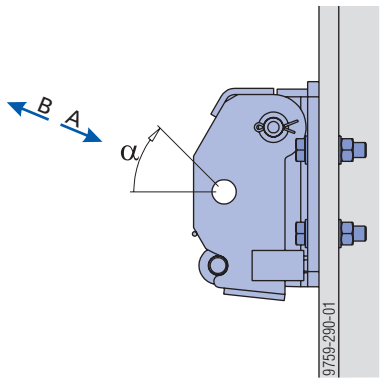
Lowering shoe SL-1

For taking the load off the spindle struts in cases where compressive loading occurs in the wall zone.



A	System beam SL-1
B	Lowering shoe SL-1
C	Screw set for Knee-brace SL-1
D	Spindle strut SL-1 T16
E	Connecting pin SL-1 D32 100 with Spring cotter 6mm

Permitted internal forces



A ... Permitted tensile/compressive forces ≤ 160 kN
B ... Permitted tensile force ≤ 80 kN

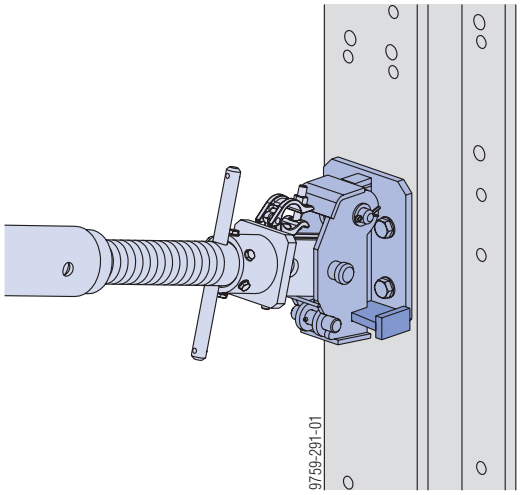
Note:
Spindle struts SL-1 T16 can be fitted in the α=45° range.

How to mount:

Important note:
➤ Make allowance for the subsequent position of the spindle struts .

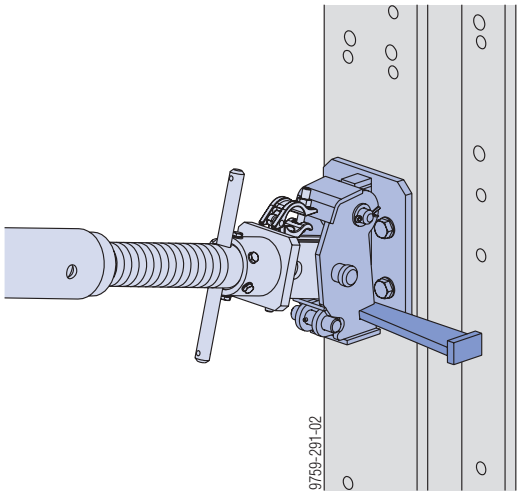
➤ Attach the Lowering shoe SL-1 using the Screw set for Knee-brace SL-1.

The wedge must be pushed in while the Lowering shoe SL-1 is being mounted.



Stripping function

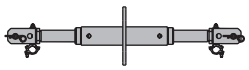
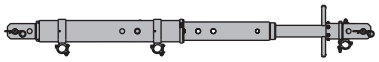
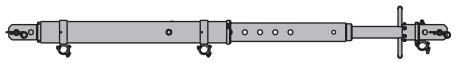
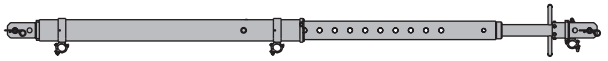
➤ A blow of the hammer to the wedge of the Lowering shoe SL-1 is all that is needed to take the load off the spindle strut.



This makes it possible to operate the spindle strut by hand.

Spindle struts SL-1 T16

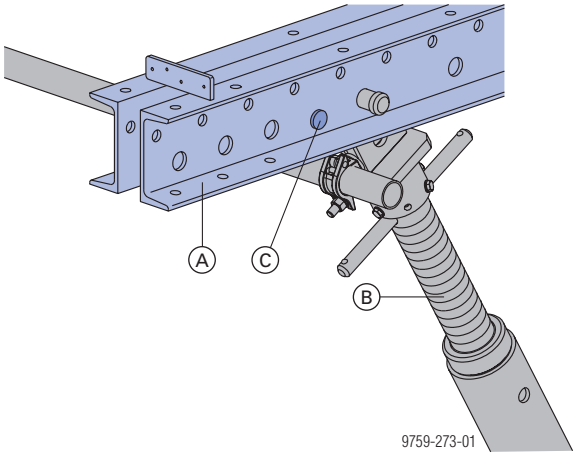
- Four sizes with usable lengths of 100 cm to 375 cm
- Overlap with next size: 55 cm
- Couplers for connecting up the scaffolding-tube bracing are permanently attached

Spindle strut SL-1 T16	Usable length		Permitted load	
	min.	max.	Tensile	Compressive
100/140cm	100 cm	140 cm	160 kN	160 kN
				
140/225cm	140 cm	225 cm	80 kN	160 kN
				
170/275cm	170 cm	275 cm	80 kN	160 kN
				
220/375cm	220 cm	375 cm	80 kN	160 kN
				

Connections

The spindle struts are bolted in place with a Connecting pin SL-1 D32 100 and secured with a Spring cotter 6mm.

- For details of how to connect to the heavy-duty supporting units, see "Connecting to the System beam SL-1".
- The spindle struts can be bolted directly onto the Multi-purpose waling SL-1 WU16.



A Multi-purpose waling SL-1 WU 16
B Spindle strut SL-1 T16
C Spacer bolt (welded in)

Overlap

By choosing the right spindle strut from the 4 available overlapping lengths, the optimum striking-distance can be obtained.

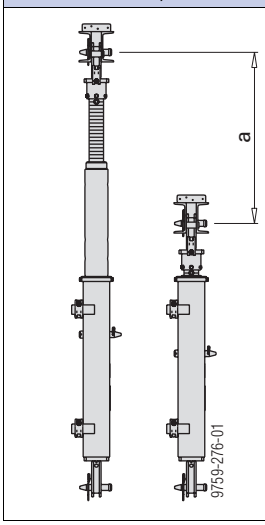
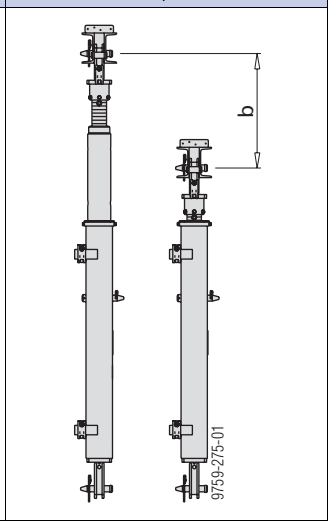
Spindle struts SL-1 T16	Remarks
100/140cm	Spindle only
140/225cm	Spindle + telescopic tube
170/275cm	Spindle + telescopic tube
220/375cm	Spindle + telescopic tube

Example:

Requirements:

- Usable length during pouring: 260 cm
- Max. lowering distance (for cleaning)

Possible types of spindle strut:

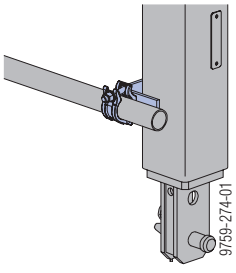
Spindle strut SL-1 T16 170/275	Spindle strut SL-1 T16 220/375
	

a ... Lowering distance 90 cm
b ... Lowering distance 40 cm

In this situation, the shorter spindle strut should be selected, as this results in a larger lowering distance.

Bracing

The scaffolding-tube couplings that are permanently attached to the spindle strut make it much easier to mount the bracing.



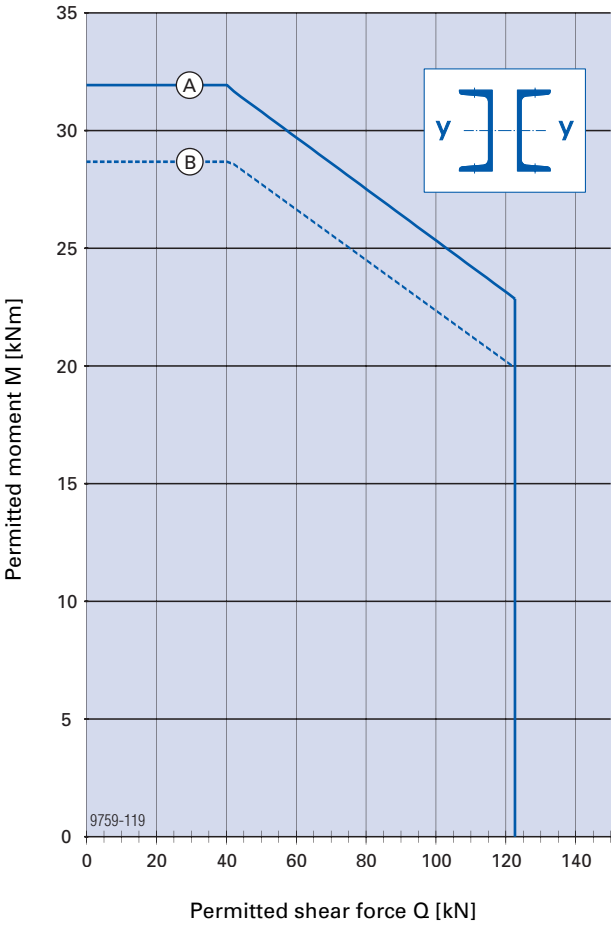
Fit bracing to all the scaffolding-tube couplings on each spindle strut.

Multi-purpose walings SL-1 WU16

- Waling lengths from 0.625 m to 3.00 m
- 20 mm diam. hole-grid (of the WS 10), to permit utilisation with Top 50 components
- 32 mm diam. hole-grid for connecting the Spindle struts SL-1 T16, and for flexurally rigid joints.
- Higher permitted loads, permitting greater influence widths

The two different integrated hole-grids make it possible to use a range of different connection methods, ensuring suitability for both cut-and-cover and underground tunnel construction situations.

Permitted internal forces: Multipurpose walings SL-1 WU16 (without proof of stability – e.g.: buckling)



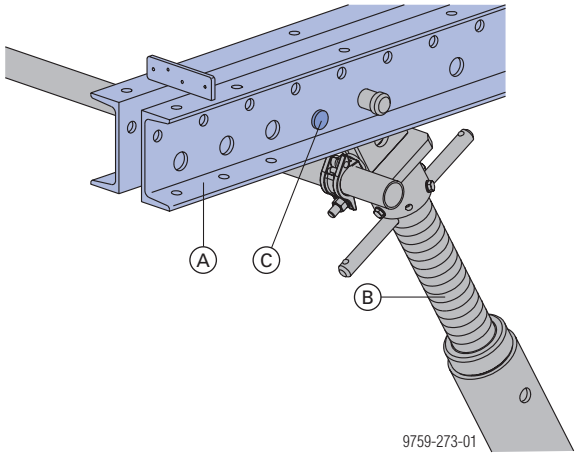
A N_f = 0 kN
B N_f = 100 kN

Technical data:
Section modulus: 232 cm³
Moment of inertia: 1850 cm⁴

Important note:
Bending and buckling loading in the weak direction decreases the permissible internal forces many times over.

Practical examples

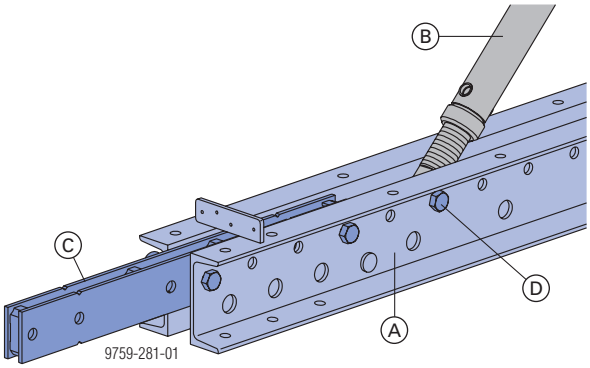
Connection for Spindle struts SL-1 T16 in the diam. 32 mm hole grid



A Multi-purpose waling SL-1 WU 16
B Spindle strut SL-1 T16
C Spacer bolt (welded in)

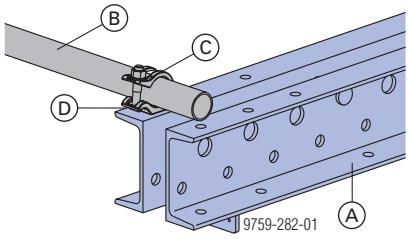
Note:
Allowance must be made for the welded-in spacer bolts when fitting connecting plates.

Connected to a spindle or strut along the continuous 20 mm diam. hole-grid.



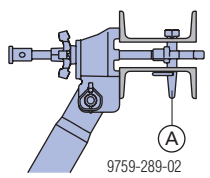
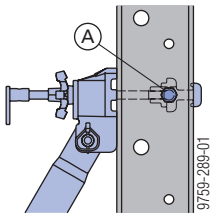
A Multi-purpose waling SL-1 WU16
B Spindle strut
C Splice plate Top 50
D Connecting pin 25 cm with spring cotter 6mm

Connected to bracing tubes by screw-on couplers



A Multi-purpose waling SL-1 WU16
B Bracing tube
C Screw-on coupler
D Limpet washer 17 + Spring washer A16

Connection methods for panel struts

Horizontal waling	Vertical waling
	

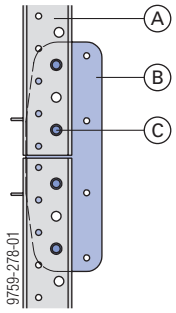
A Connecting pin 10cm + Spring cotter 6mm

Waling connector SL-1 WU16 0.75m

Flexurally rigid link

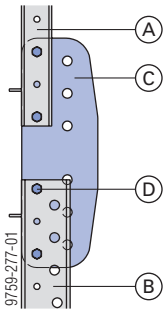
Flexurally rigid mounting of the Waling connector SL-1 WU16 0.75m on the Multi-purpose waling SL-1 WU16 0.625m is only possible from one side.

➤ Be careful to mount in the right direction.



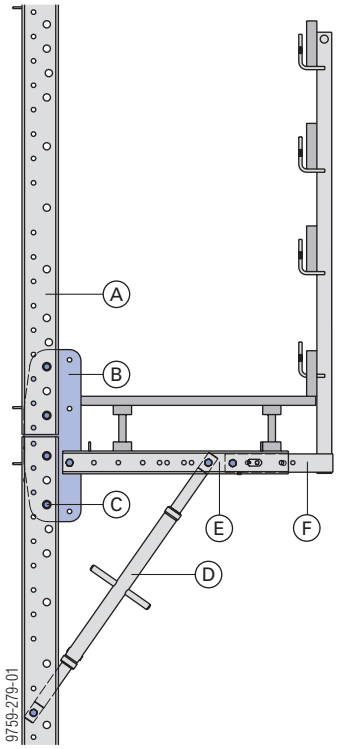
A Multi-purpose waling SL-1 WU16
B Waling connector SL-1 WU16 0.75m
C Connecting pin SL-1 D32 100 with Spring cotter 6mm

Flexurally rigid WS10 joint



A Multi-purpose waling WS10 Top50
B Multi-purpose waling SL-1 WU16
C Waling connector SL-1 WU16 0.75m
D Connecting pin 25 cm with spring cotter 6mm

Connecting up platforms



A Multi-purpose waling SL-1 WU16
B Waling connector SL-1 WU16 0.75m
C Connecting pin SL-1 D32 100 with Spring cotter 6mm
D Spindle strut T6 100/150cm
E Multi-purpose waling WS10 Top50
F Handrail post T 1.80m

Placing and attaching the Doka beams

Doka beams and walings are quickly assembled into finished elements, using simple connecting devices - either on-site or by the Doka "Ready-to-Use" Service.

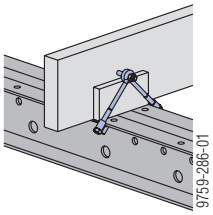
Various ways of fastening the Doka beams

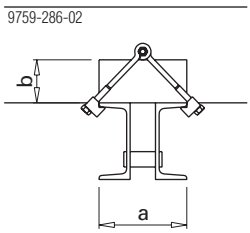
Flange claw

Also for subsequent fastening of Doka H20/H30 beams or squared timbers to any position on walings and (IPB-section) steel girders.

Tools needed:

- Drill bit, diam. 12 mm
- Reversible ratchet 1/2"
- Nut for box spanner 19





Clamping ranges [cm]

b	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
a_{min}	17.3	17.1	17.0	16.7	16.3	16.0	15.5	14.8	14.2
a_{max}	29.0	28.9	28.8	28.7	28.6	28.4	28.1	27.7	27.4

Clamping ranges [cm]

b	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
a_{min}	13.4	12.5	11.4	10.1	10.0	10.0	10.0	10.0	10.0
a_{max}	27.1	26.7	26.0	25.5	25.1	24.4	23.7	23.0	22.2

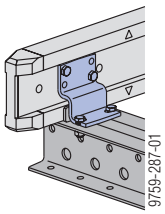
Fastening plate

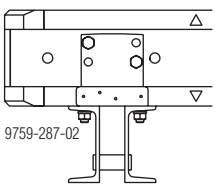
For formwork elements intended for high numbers of repeat uses, or for providing stiffening reinforcement and for transferring longitudinal forces.

Can only be screwed onto the ends of the waling (in the case of walings of 1.00 m and above), to the left or right of the connection plate, in the flanges.

Tools needed:

- Drill bit, diam. 17 mm
- Reversible ratchet 1/2"
- Box nut 24
- Fork spanner 24





Flange-clamp G

- for fastening the Doka beam H20 anywhere on the waling.

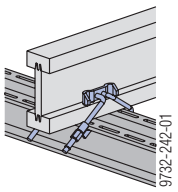
Can also be used on steel girders such as I-girders etc.

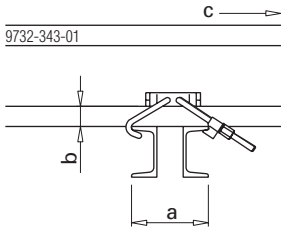
Note:

First push the flange-clamps onto the Doka beam, and only then place the Doka beam onto the waling.

Tools needed:

- Reversible ratchet 1/2"
- Nut for box spanner 19





c ... Bottom of formwork

Clamping ranges [cm]

b	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
a_{min}	15.8	15.8	15.0	14.5	13.4	13.2	13.0	13.0	12.8
a_{max}	23.8	23.3	23.2	22.7	22.3	21.9	21.3	20.7	20.0

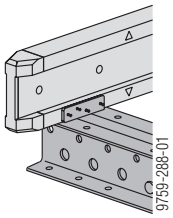
Clamping ranges [cm]

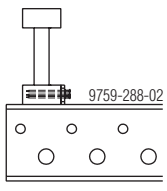
b	4.5	5.0	5.5	6.0
a_{min}	12.3	11.5	11.8	12.0
a_{max}	19.3	18.2	16.8	14.6

Double-headed nails 80mm

The connection plates serve as stop-bars for the edge beams and can also be used for fixing the beams in place.

Fasten the Doka beam to the connection plate with 4 double-headed nails.

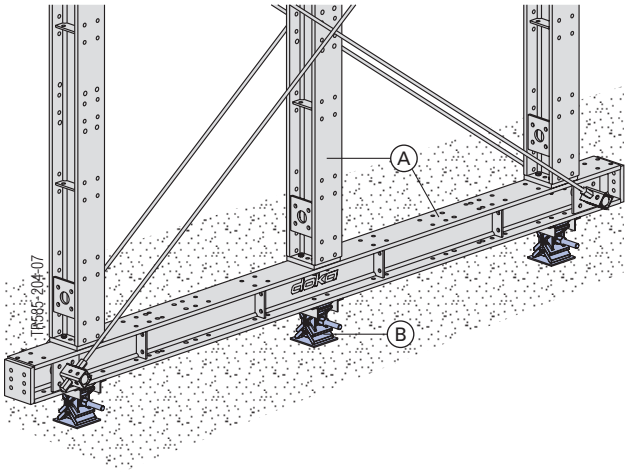




Lowering the heavy-duty supporting units

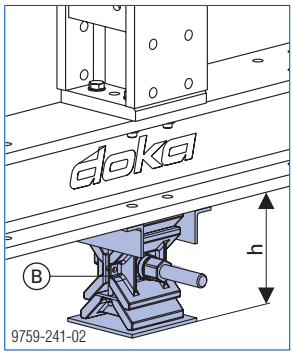
Lowering wedge SL-1 420kN

for adjusting the height of the HD supporting units, and taking loads off them.



A System beams SL-1
B Lowering wedge SL-1 420kN

Close-up of lowering wedge:



h ... from 16.8 cm to 26.8 cm

Permitted load to DIN 4421, Section 6.5.1:
Test certificate II B4-540-19/91
$F_{perm.}$ = 420 kN
allowing for a load-application eccentricity E≤20 mm or an additional horizontal force ≤0.069x$F_{perm.}$
Settlement: 1mm/100 kN

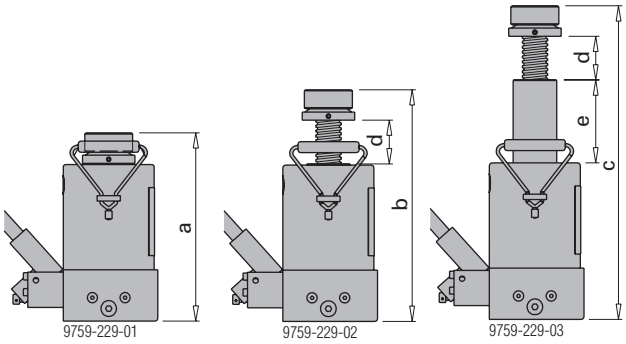
Lowering using the "Lowering cylinder SL-1 250kN"

Several different types of traveller units are available for repositioning the HD supporting units. Regardless of which type is used, the unit always has to be lowered onto the relevant travelling construction first.

- The floor must be stable, firm and sufficiently smooth (e.g. concrete).

Permitted lifting force: 250 kN on a gradient of up to 5%

System dimensions



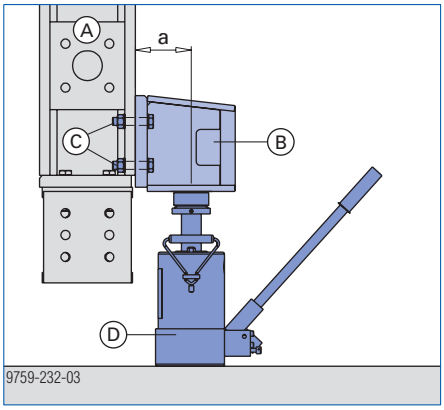
a ... minimum overall height: 34.5 cm
b ... height with max. spindle-extension: 42.5 cm
c ... max. height, with max lift and spindle extension, 57.5 cm
d ... max. spindle-extension: 8.0 cm
e ... max. lift: 15.0 cm

Follow the directions in the Operating Instructions!

Bracket SL-1

This is used if there are no suitable points of application for the lowering cylinder beneath the Heavy-duty supporting unit (either because the clearance between the System beam and the ground is too small, or because there are no cross-profiles)

Permitted lowering load where 'a'=11.0 cm:
200 kN



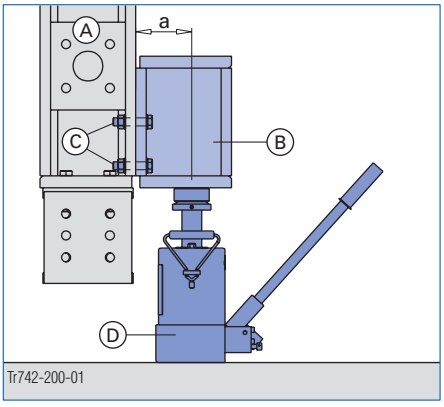
A	System beam SL-1
B	Bracket SL-1
C	Screw-set M22x90 DIN 931 8.8
D	Lowering cylinder SL-1 250kN

Important note:

If it cannot be guaranteed that the load will remain under 200 kN, then the Travelling gear distancer SL-1 must be used

Travelling gear distancer SL-1 330mm

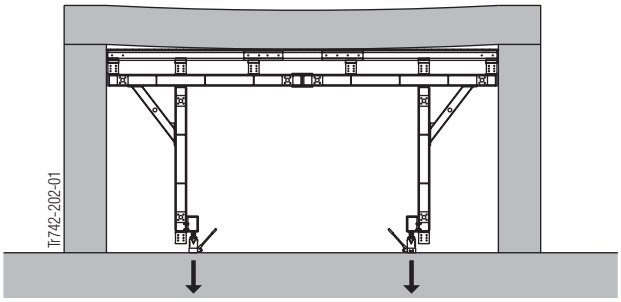
Permitted lowering load where 'a'=16.0 cm:
320 kN



A	System beam SL-1
B	Bracket SL-1
C	Screw-set M22x90 DIN 931 8.8
D	Lowering cylinder SL-1 250kN

Where large HD supporting units are used under straight cover-slabs, the entire slab load momentarily rests on the lowering cylinders when the load is taken off the lowering wedges.

These momentary loads are no problem for the Lowering cylinders SL-1 250kN, as these cylinders are equipped with an overload function.

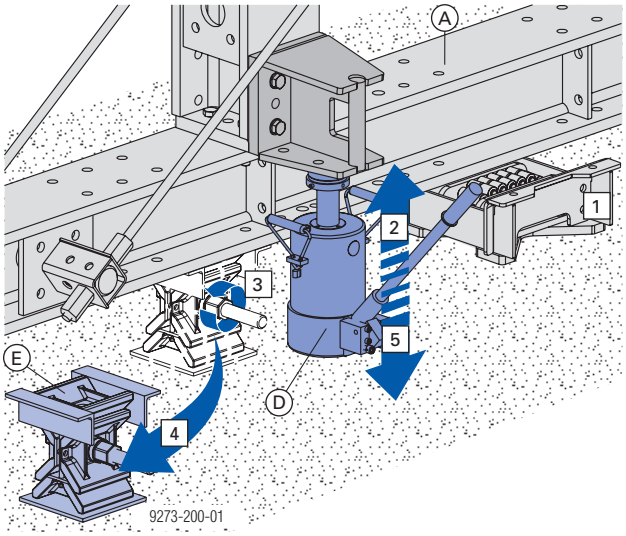


Lowering procedure

Important note:

➤ A suitable holdback restraint must be in place for upslopes or downslopes.

1) If the traveller units are not already pre-mounted, position them centrally beneath the HD supporting units
(depending on the repositioning method that has been selected).
2) Using the Lowering cylinders **(D)** , slightly raise the unit (thereby taking the load off the lowering wedge).
3) Take the load off the heavy-duty supporting unit **(A)** with the aid of the lowering wedges **(E)** and a suitable ring or fork spanner (width-across 46mm).
4) Remove the lowering wedges.
5) Using the Lowering cylinders, lower the entire unit onto the traveller units or (if these are already mounted) down to the ground.



Repositioning using heavy-duty rollers

with Heavy duty roller gear SL-1 300kN and Guidance for heavy duty roller gear SL-1

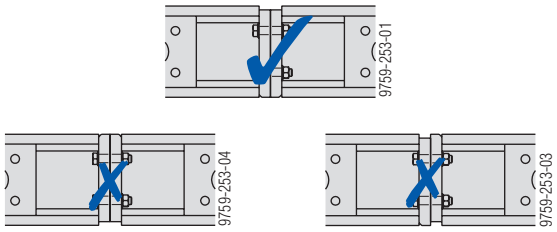
for straight-line repositioning of HD supporting units where there is not a continuous base slab with sufficient load-bearing capacity.

- A suitable holdback restraint must be in place for upslopes or downslopes.
- Max. travel speed 5m/min.
- The Heavy duty roller gear SL-1 300kN is only designed to be moved with its rollers in the horizontal.
- "Passenger transportation" is forbidden.

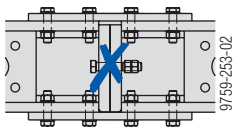
Preconditions for use:

The system beams must be joined in such a way that they present a smooth, flat underside when moved over the top of the heavy-duty rollers. For this reason, observe the following points during assembly:

The flanges of the system beams must be flush on the underside!

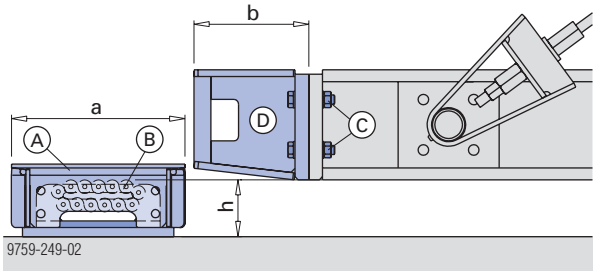


The system beams must not be butt-strap jointed!



The max. load per Heavy duty roller gear SL-1 300kN – where the load is applied centrally – is 30,000 kg

System dimensions:

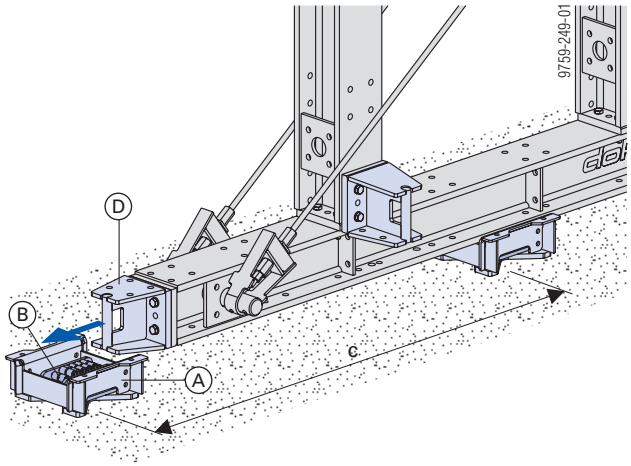


a ... 37.8 cm
b ... 25.0 cm
h ... 12.4 cm

Repositioning procedure:

➤ Lower the HD supporting unit with the lowering cylinder (see "Lowering the heavy-duty supporting units").

➤ Move the HD supporting unit over the heavy-duty rollers (oblique pull is not permitted).



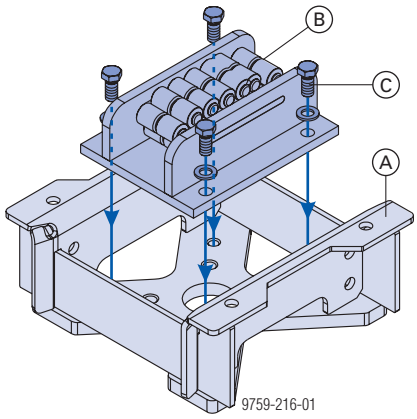
c ... Distance as per shop drawing

A	Guidance for heavy duty roller gear SL-1
B	Heavy duty roller gear SL-1 300kN
C	Screw-set M22x90 DIN 931 8.8
D	Bracket SL-1

Permitted horizontal tensile force per Bracket SL-1: 60 kN

Permitted vertical load at the front of the Bracket SL-1: 110 kN

Assembling the Heavy duty roller gear SL-1 300kN:



A	Guidance for heavy duty roller gear SL-1
B	Heavy duty roller gear SL-1 300kN
C	Screw set for "Guidance for heavy duty roller gear SL-1"

Follow the directions in the Operating Instructions!

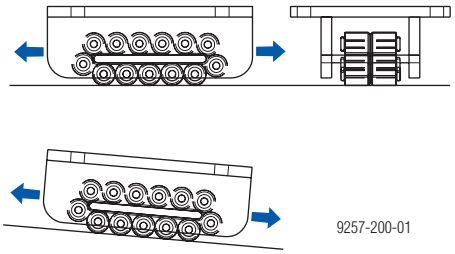
with Heavy duty roller gear SL-1 300kN and Inner plate SL-1

The Heavy duty roller gear SL-1 300kN may only be used to travel heavy constructions in a straight line on level trackways with sufficient load-bearing capacity.

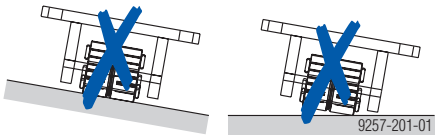
Roller-gear can only be travelled on steel plates **(G)** or girders! These must be secured against slippage.

- The Heavy-duty roller gear must be joined to the load either non-positive frictionally or by positive locking.
- There must be a trackway in place that has sufficient load-bearing capacity to withstand the high contact pressure of the heavy-duty rollers (e.g. thick steel plate or HEM profile beams).
- Keep the travel route clean and free of any obstacles.
- A suitable holdback restraint must be in place for upslopes or downslopes.
- Max. travel speed 5m/min.
- The Heavy duty roller gear SL-1 300kN is only designed to be moved with its rollers in the horizontal.

Right:



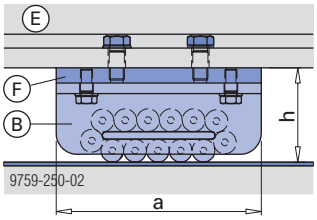
Wrong:



- "Passenger transportation" is forbidden.

The max. load per Heavy duty roller gear SL-1 300kN – where the load is applied centrally – is 30,000 kg

System dimensions:

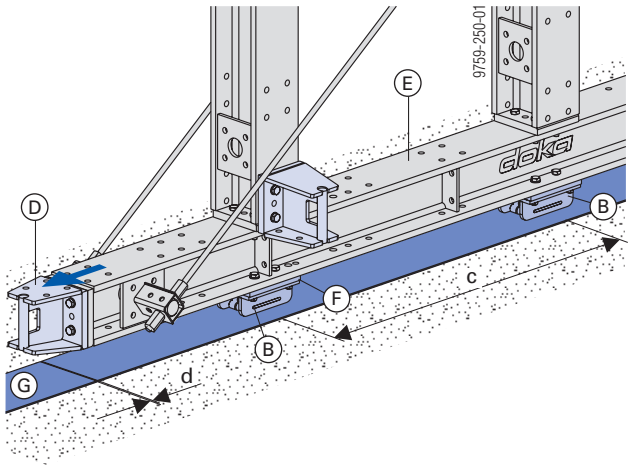


a ... 27.0 cm
h ... 10.4 cm

Repositioning procedure:

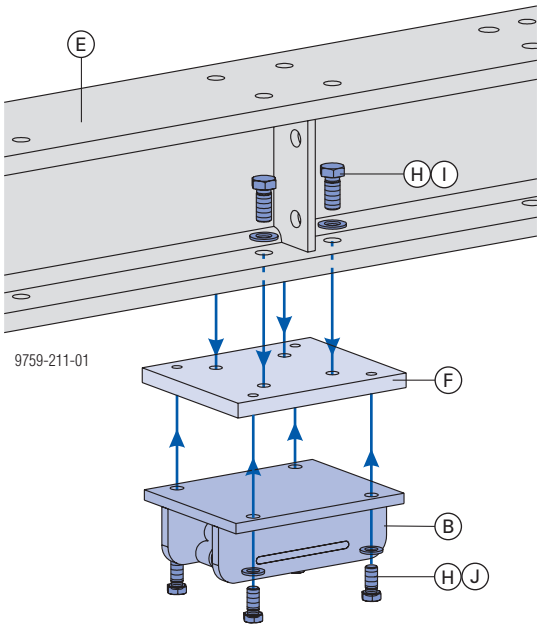
➤ Lower the HD supporting unit with the hydraulic jack (see "Lowering the heavy-duty supporting units").

➤ Move the HD supporting unit over the heavy-duty rollers (oblique pull is not permitted).



c ... Distance as per shop drawing
d ... Max. gap between the steel plates: 1 mm, and no height mismatch

Assembling the Heavy duty roller gear SL-1 300kN:



B	Heavy duty roller gear SL-1 300kN
D	Bracket SL-1
E	System beam SL-1
F	Inner plate SL-1
H	Screw set for Inner plate SL-1
I	Four M20x45 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item H)
J	Four M16x35 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item H)

Follow the directions in the Operating Instructions!

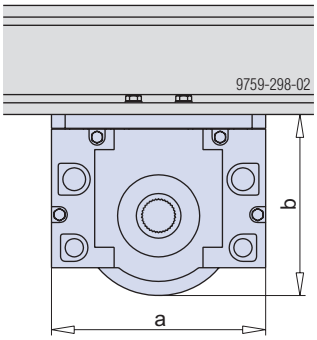
Repositioning with the Flanged wheel SL-1

For rail-guided, straight-line repositioning of HD supporting units.

- A suitable holdback restraint must be in place for upslopes or downslopes.
- Max. travel speed 1.5m/min.
- "Passenger transportation" is forbidden.
- Can be travelled either hydraulically or with suitable towing machines.
- There must be a firm (e.g. concrete) floor capable of supporting the load.

The max. load per Flanged wheel SL-1 – assuming central load application – is 22,000 kg

System dimensions:

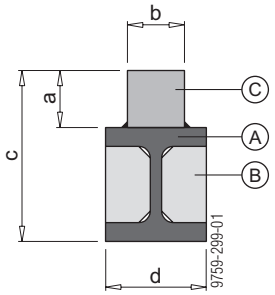


a ... 470 mm
b ... 400 mm

Design/construction of rail

The basis for the rail is provided by a tilt-proof and (if necessary) flexurally rigid section girder, with sufficient load-bearing capacity. The inner spaces of this section girder must be fixed with suitable plates.

A strap-rail (S 355) is welded onto this section girder.



a ... min. 55 mm
b ... min. 55 mm - max. 70 mm
c ... max. 2 x d

A	Tilt-proof section girder
B	Inner-space fixing plate
C	Strap-rail

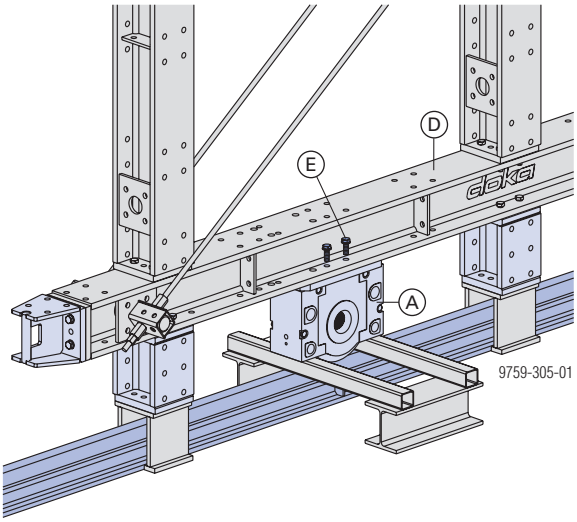
Design and construct the rails in accordance with structural-design requirements.

Fix the rails in such a way as to prevent any mismatch at the joins.

Repositioning using towing machine

How to mount:

➤ Bring the Flanged wheel SL-1 to the installation position on the system beam and attach it with hexagonal bolts.



A	Flanged wheel SL-1 220kN
D	System beam SL-1
E	Four M20x55 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item A)

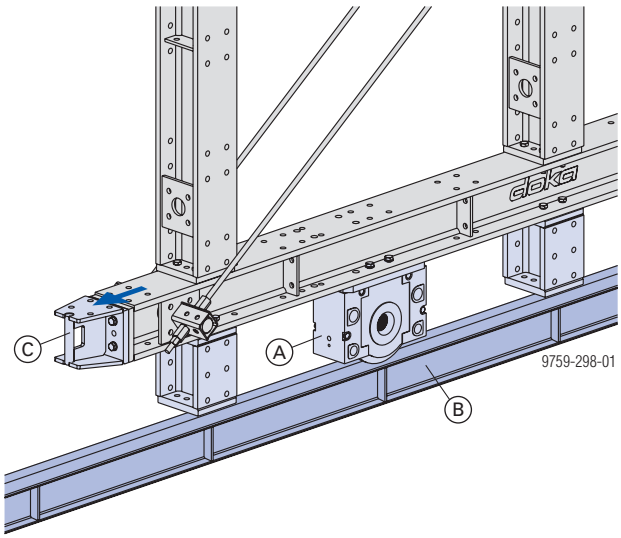
Repositioning procedure:

➤ Fasten slinging means to the brackets and to the towing machine (oblique pull is not permitted).

➤ Lower the HD supporting unit with the lowering cylinder (see "Lowering the heavy-duty supporting units").

Before setting down the HD supporting unit, check to ensure that the rail is in the correct location in relation to the flanged wheel.

➤ Tow the HD supporting unit to its new service position.



A	Flanged wheel SL-1 220kN
B	Rail
C	Bracket SL-1

Permitted horizontal tensile force per Bracket SL-1: 60 kN

Permitted vertical load at the front of the Bracket SL-1: 110 kN

Repositioning using Hydraulic drive SL-1

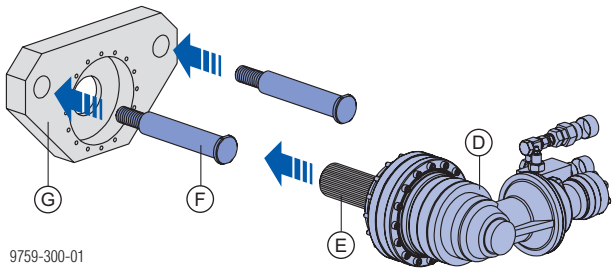
How to mount:

Smooth long-term operation can only be ensured if the Hydraulic drive SL-1 has been correctly installed onto the travel-system.

➤ Insert the toothed shaft into the housing on the Hydraulic drive SL-1.

➤ Push the bolts through the holes in the gear-unit housing.

➤ Bolt the Hydraulic drive SL-1 to the gear-unit housing.



D Hydraulic drive SL-1
E Toothed shaft
F Bolt
G Gear-unit housing

➤ To attach the Hydraulic drive, use only the enclosed 16 hexagon socket cheese-head screws, M10x90 8.8 DIN 912. All the connection holes on the gear-unit flanges must be used.

➤ Lubricate the screws with WD40.

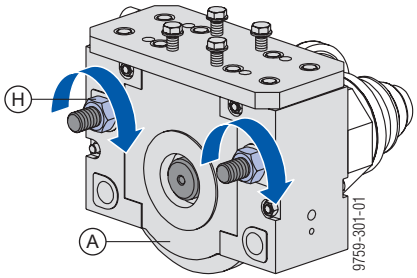
Tightening torque: 15-20 Nm

Ensure that the Hydraulic drive **(D)** is in the horizontal.

➤ Push the Flanged wheel SL-1 onto the toothed shaft.

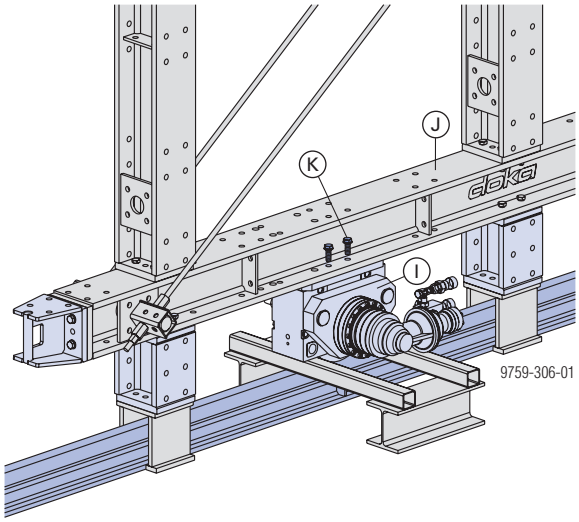
➤ The hydraulic drive is unable to transfer either radial or axial forces. For this reason, great care must be taken to ensure that it is fitted coaxially and at right-angles to the sleeve shaft.

➤ Fix the flanged wheel to the gear-unit housing with hexagon nuts.



A Flanged wheel SL-1 220kN
H Hexagon nut M36 (width-across: 55 mm)

➤ Bring the complete drive unit to the installation position on the system beam and attach it with hexagonal bolts.



I Complete drive unit
J System beam SL-1
K Four M20x55 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item A)

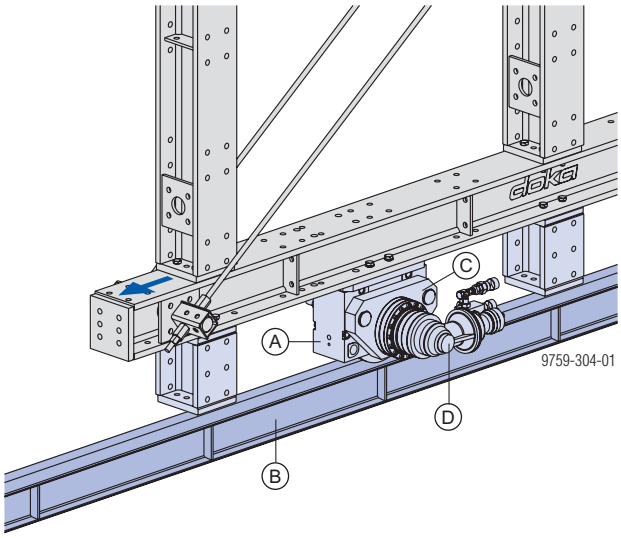
Follow the directions in the "Hydraulic drive SL-1" Operating Instructions!

Repositioning procedure:

➤ Lower the HD supporting unit with the lowering cylinder (see "Lowering the heavy-duty supporting units").

Before setting down the HD supporting unit, check to ensure that the rail is in the correct location in relation to the flanged wheel.

➤ Move the HD supporting unit to its new service position with the Hydraulic drive SL-1.



A	Flanged wheel SL-1 220kN
B	Rail
C	Connection set for Flanged wheel SL-1
D	Hydraulic drive SL-1

Drive hydraulic unit SL-1

Hydraulic unit for driving up to 2 Hydraulic drives SL-1.

Note:

Hydraulic tubes are not included in the scope of supply.

2 pairs of hydraulic tubes are needed for each hydraulic drive.

Suitable pairs of hydraulic tubes:

Name	Art.n°
Pair of hydraulic tubes 5.00m	580873000
Pair of hydraulic tubes 7.50m	580874000
Pair of hydraulic tubes 10.00m	580875000

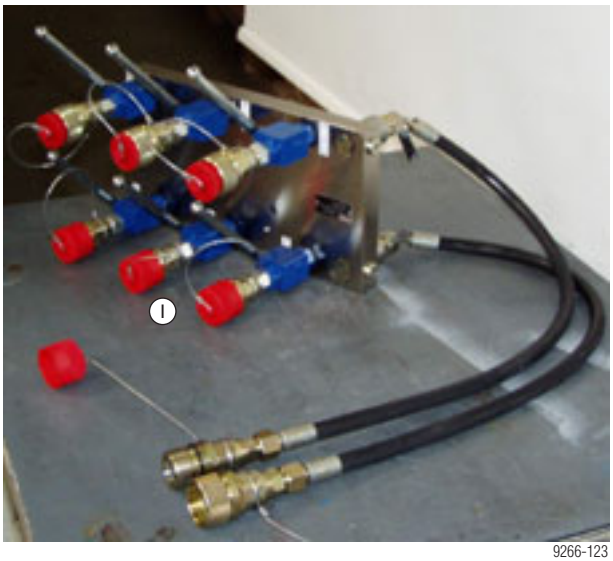
Follow the directions in the Operating Instructions!

Hydraulic system

Note:
The EC "Machinery" Directive 89/392/EEC stipulates that all formwork systems that are moved either electrically or hydraulically are subject to mandatory CE labelling requirements. For this reason, a hazard analysis and an Operating Instructions manual must be drawn up for the entire system, in every case.

The formwork is moved by means of a hydraulic branch-line system.

- The hydraulic unit has 6 hydraulic outlets. These assure the same constant delivery rates, regardless of the load pressure.
- In practice, 6 cylinders are often not sufficient.
  It is possible to increase the number of cylinders by using the Hydraulic distributor, art.n° 580808000 **(I)** . This divides up the 6 hydraulic circuits A-F into 3 groups of 6 hydraulic circuits (makes it possible to connect up to 18 cylinders)



9266-123

Due to the many different strokes and load ratings for hydraulic cylinders used in the formwork technology field, it is difficult or impossible to standardise cylinders. This is why in most cases, custom cylinders are used.

Planning note

Important where the cylinder is subjected to push/pull loads:

When the distribution valves are being switched over, the switch passes through an intermediate position which may cause unintentional lowering of the load.

Remedy: Fit lowering brake-valves to the load-side of the hydraulic cylinders.

Hydraulic unit

Follow the directions in the Operating Instructions!

Note:
If the unit needs to be lifted, it should only be slung from, and lifted by, the crane hoisting lugs provided.

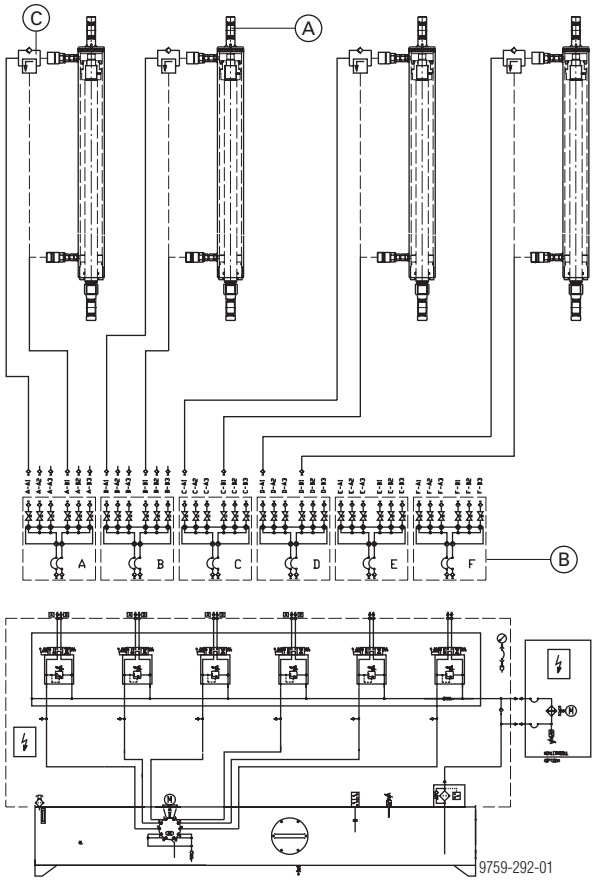
Hydraulic unit for forming-operations

Is supplied to the site ready for operation.

9266-106

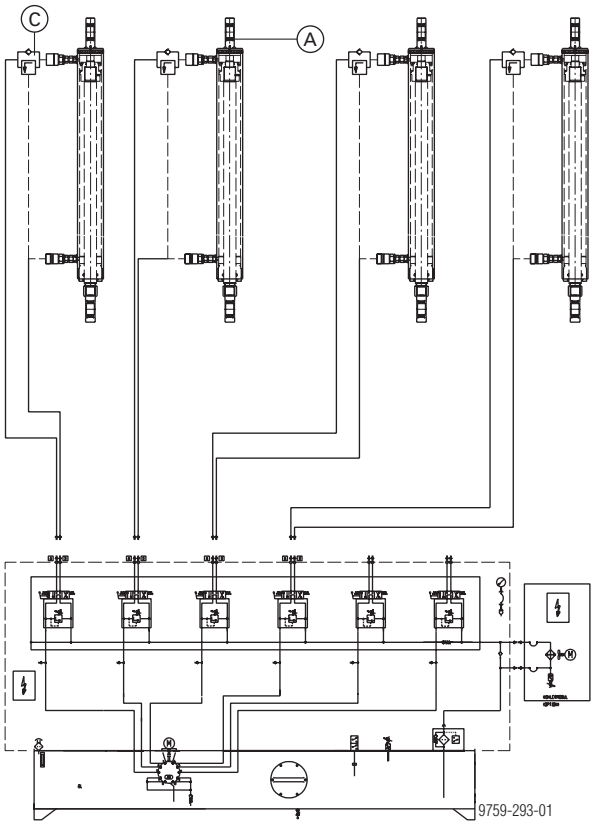
Hydraulic branch-line system

Cylinder connection via distributor blocks



A Hydraulic cylinder
B Distributor blocks
C Lowering brake-valve

Cylinder connection directly on the hydraulic unit



A Hydraulic cylinder
C Lowering brake-valve

Heavy-duty props for stationary sub-structures

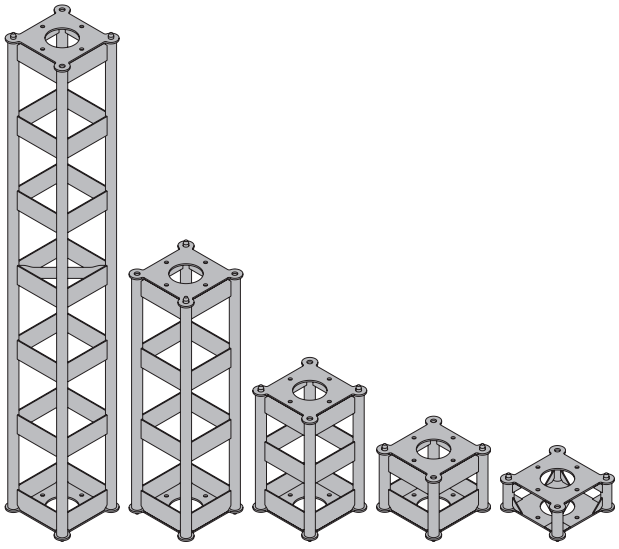
Struts SL-1

The Strut SL-1 is a segment-based modular system.

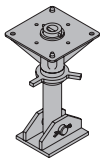
Important note:

The Strut SL-1 is a pressure strut only. It cannot transfer tensile forces.

Overview of variants

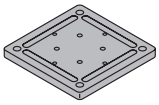
Strut SL-1				
				
2.50m	1.25m	0.625m	0.312m	0.156m

Prop spindle SL-1



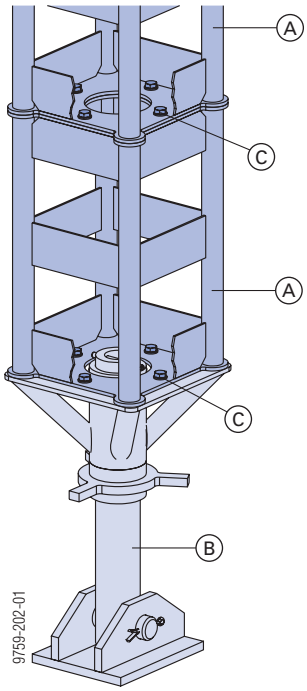
The Prop spindle SL-1 is for length adjustment only, and is not suitable for being untensioned when under load.

Basic plates SL-1



Comply with the possible areas of use and deployment limitations given in the type-test!

Connecting the Strut SL-1 to the Prop spindle SL-1



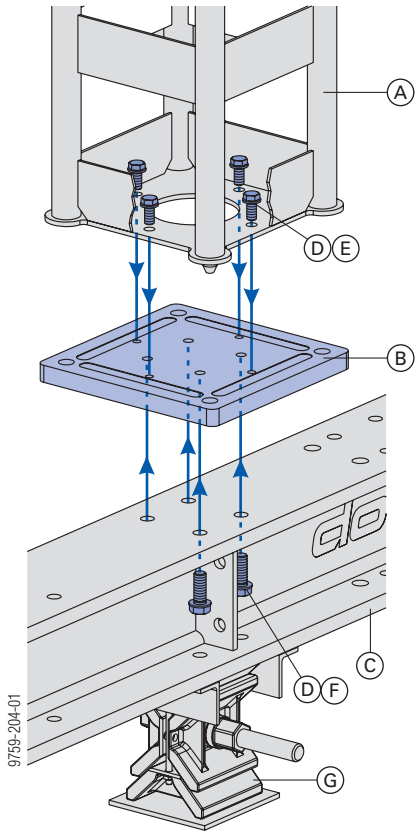
A	Strut SL-1
B	Prop spindle SL-1
C	Screw-set M16x40 DIN 933 8.8

Connecting to the System beam SL-1

with the Basic plate SL-1

Important note:

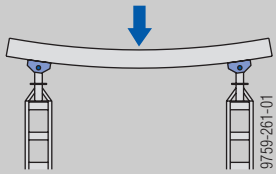
- Only permitted if there is no risk of deformation to the beam!
- Ensure that no bending moments will be transferred into the Strut SL-1 (e.g. position a lowering wedge directly under the prop)!
- Always mount the Basic plate SL-1 in such a way that the milled-out recess is facing the Strut SL-1.



A	Strut SL-1
B	Basic plate SL-1
C	System beam SL-1
D	Screw set for Basic plate SL-1
E	Four M16x35 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item D)
F	Four M20x45 8.8 hexagonal bolts + 4 washers (included in scope of supply of Item D)
G	Lowering wedge SL-1 420kN

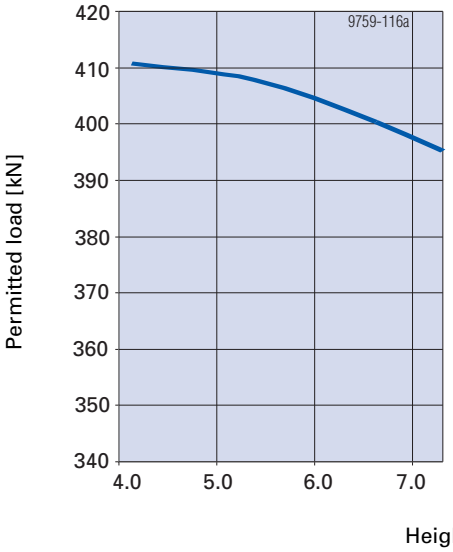
Instructions for erecting correctly

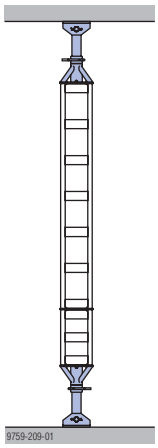
Caution!
Tilting of the bearing supports is only permitted at the spindle-end of the strut.



➤ Plan to locate the tilting axis of the bolt (between the spindle tube and the headplate) perpendicular to the longitudinal axis of the primary beam.

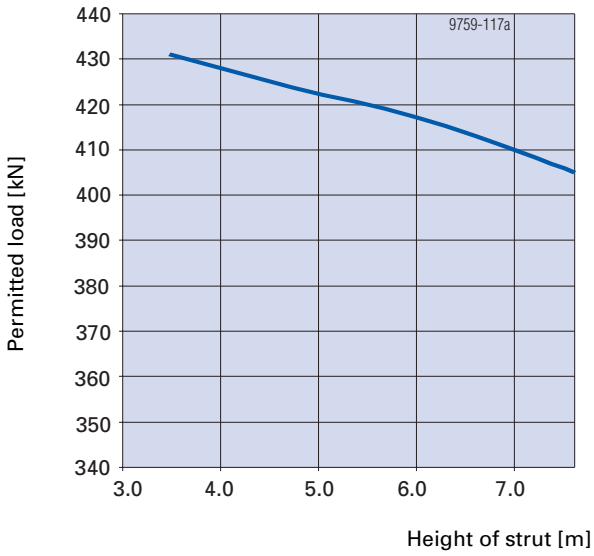
Head and foot with Prop spindle SL-1; wind on the prop

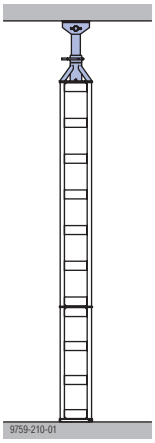




Height of strut [m]		Strut SL-1				Prop spindle SL-1	Screw-set M16x40 DIN 933 8.8	Weight [kg]
min.	max.	0.312 m	0.625 m	1.250 m	2.500 m			
1.40	1.64	1	--	--	--	2	2	193
1.52	1.96	--	1	--	--	2	2	205
1.83	2.27	1	1	--	--	2	3	235
2.14	2.58	--	--	1	--	2	2	226
2.45	2.89	1	--	1	--	2	3	256
2.77	3.21	--	1	1	--	2	3	268
3.08	3.52	1	1	1	--	2	4	297
3.39	3.83	--	--	--	1	2	2	272
3.70	4.14	1	--	--	1	2	3	301
4.02	4.46	--	1	--	1	2	3	313
4.33	4.77	1	1	--	1	2	4	343
4.64	5.08	--	--	1	1	2	3	334
4.95	5.39	1	--	1	1	2	4	364
5.27	5.71	--	1	1	1	2	4	376
5.58	6.02	1	1	1	1	2	5	405
5.89	6.33	--	--	--	2	2	3	380
6.20	6.64	1	--	--	2	2	4	409
6.52	6.96	--	1	--	2	2	4	421
6.83	7.27	1	1	--	2	2	5	451

Head with Prop spindle SL-1; foot with Basic plate SL-1; wind on the prop



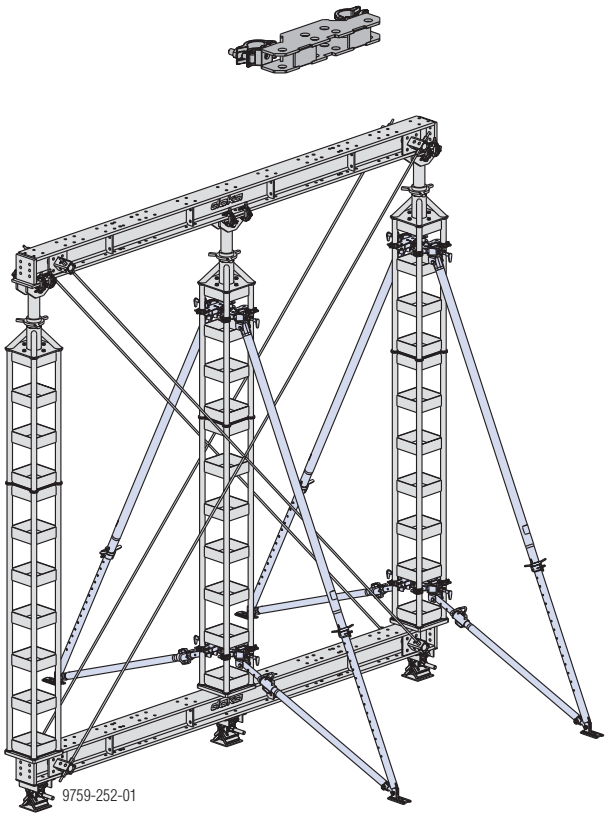


Height of strut [m]		Basic plate SL-1	Strut SL-1					Prop spindle SL-1	Screw-set Strut SL-1	Weight [kg]
min.	max.		0.156 m	0.312 m	0.625 m	1.250 m	2.500 m			
0.79	1.01	1	--	1	--	--	--	1	1	145
0.94	1.16	1	1	1	--	--	--	1	2	167
1.10	1.32	1	--	--	1	--	--	1	1	157
1.26	1.48	1	1	--	1	--	--	1	2	179
1.41	1.63	1	--	1	1	--	--	1	2	186
1.57	1.79	1	1	1	1	--	--	1	3	209
1.73	1.95	1	--	--	--	1	--	1	1	178
1.88	2.10	1	1	--	--	1	--	1	2	200
2.04	2.26	1	--	1	--	1	--	1	2	207
2.19	2.41	1	1	1	--	1	--	1	3	230
2.35	2.57	1	--	--	1	1	--	1	2	219
2.51	2.73	1	1	--	1	1	--	1	3	242
2.66	2.88	1	--	1	1	1	--	1	3	249
2.82	3.04	1	1	1	1	1	--	1	4	271
2.98	3.20	1	--	--	--	--	1	1	1	223
3.13	3.35	1	1	--	--	--	1	1	2	246
3.29	3.51	1	--	1	--	--	1	1	2	253
3.44	3.66	1	1	1	--	--	1	1	3	275
3.60	3.82	1	--	--	1	--	1	1	2	265
3.76	3.98	1	1	--	1	--	1	1	3	287
3.91	4.13	1	--	1	1	--	1	1	3	294
4.07	4.29	1	1	1	1	--	1	1	4	316
4.23	4.45	1	--	--	--	1	1	1	2	286
4.38	4.60	1	1	--	--	1	1	1	3	308
4.54	4.76	1	--	1	--	1	1	1	3	315
4.69	4.91	1	1	1	--	1	1	1	4	337
4.85	5.07	1	--	--	1	1	1	1	3	327
5.01	5.23	1	1	--	1	1	1	1	4	349
5.16	5.38	1	--	1	1	1	1	1	4	356
5.32	5.54	1	1	1	1	1	1	1	5	379
5.48	5.70	1	--	--	--	--	2	1	2	331
5.63	5.85	1	1	--	--	--	2	1	3	354
5.79	6.01	1	--	1	--	--	2	1	3	361

Height of strut [m]		Basic plate SL-1	Strut SL-1					Prop spindle SL-1	Screw-set Strut SL-1	Weight [kg]
min.	max.		0.156 m	0.312 m	0.625 m	1.250 m	2.500 m			
5.94	6.16	1	1	1	--	--	2	1	4	383
6.10	6.32	1	--	--	1	--	2	1	3	373
6.26	6.48	1	1	--	1	--	2	1	4	395
6.41	6.63	1	--	1	1	--	2	1	4	402
6.57	6.79	1	1	1	1	--	2	1	5	424
6.73	6.95	1	--	--	--	1	2	1	3	394
6.88	7.10	1	1	--	--	1	2	1	4	416
7.04	7.26	1	--	1	--	1	2	1	4	423
7.19	7.41	1	1	1	--	1	2	1	5	445
7.35	7.57	1	--	--	1	1	2	1	4	435

Techniques to facilitate assembly

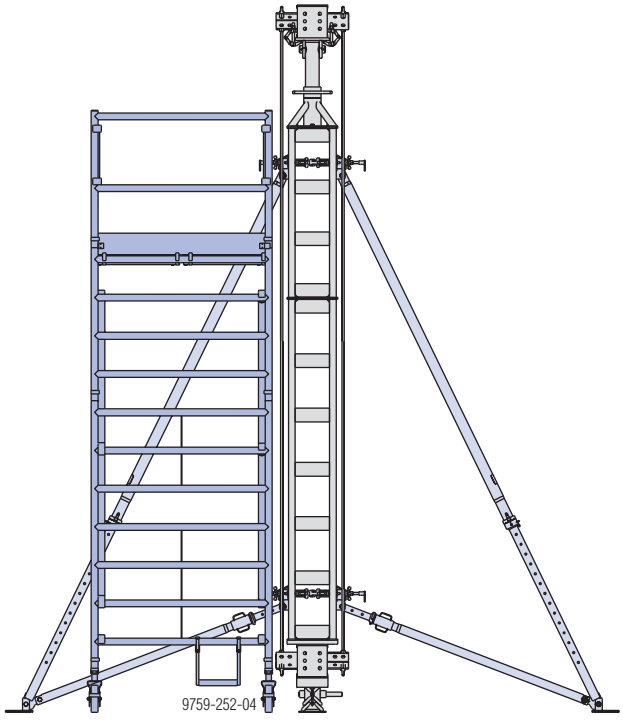
with Connection adapter SL-1



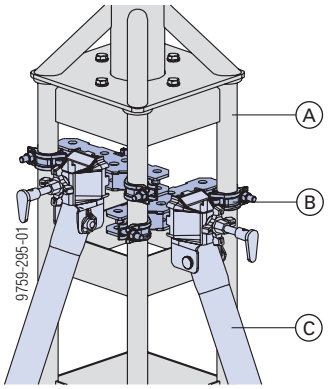
Important note:

Transmitting forces into the Strut SL-1 by way of the Connection adapter SL-1 is only permitted during assembly!

To carry out assembly work in safety, we recommend using suitable service towers or telescopic work-platforms.



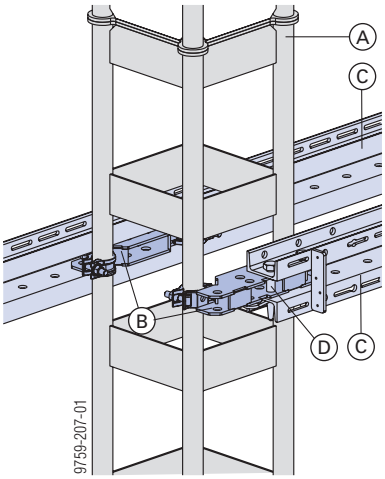
Connecting up panel struts



A	Struts SL-1
B	Connection adapter SL-1
C	Panel strut 340 or 540

Connecting up multipurpose or steel walings

e.g. as stiffening reinforcements during assembly.

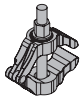


A	Struts SL-1
B	Connection adapter SL-1
C	Multi-purpose waling or Steel waling WS10 Top50
D	Connecting pin 10cm with Spring cotter 6mm

Clamping-connections

using the Beam clamp SL-1

for connecting steel sections with parallel flanges.



Clamping range: 16 to 70 mm
Width-across 24 mm

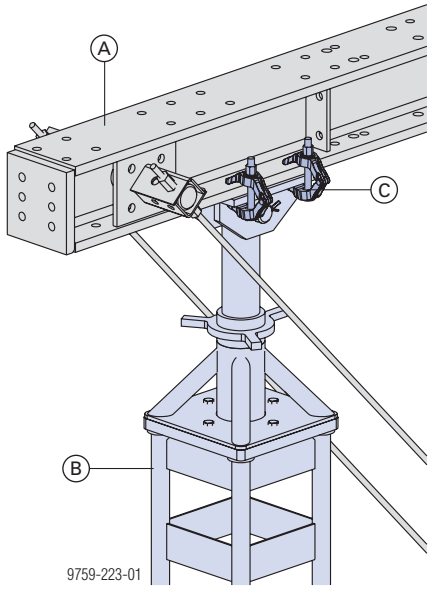
Tightening torque 150 Nm

Caution!
Beam clamps SL-1 may only be used for fixing components in the right positions to one another.

- ➤ In a connection made with beam clamps, the only forces which are allowed to be transferred are friction forces in the friction surfaces, and/or compressive forces perpendicular to these.
- ➤ Tensile forces perpendicular to the friction surface are not allowed.
- ➤ At least 2 beam clamps for each component connected.
- ➤ The components to be joined must be planned with level, parallel bearing surfaces.
- ➤ May only be used where mainly dead loads are encountered - **not for HD supporting units that will be repositioned**!

Comply with the building-industry approval (Z-8.34-873)!

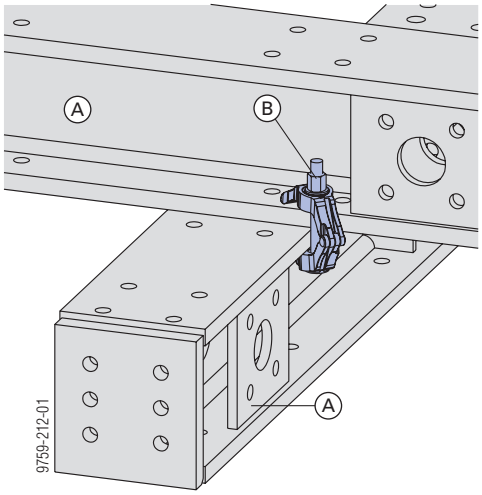
Clamping a System beam SL-1 to a Prop spindle SL-1



A System beam SL-1
B Prop spindle SL-1
C Beam clamp SL-1

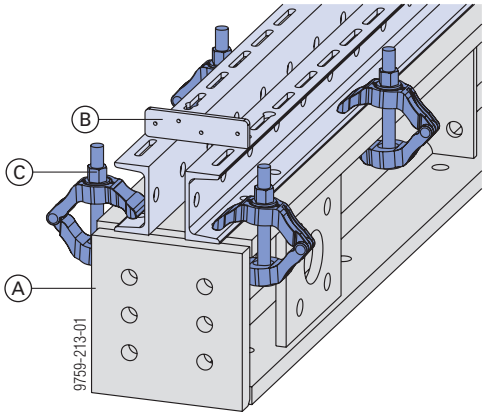
Clamping two System beams SL-1

➤ Locate two Beam clamps SL-1 diagonally to one another.



A System beam SL-1
B Beam clamp SL-1

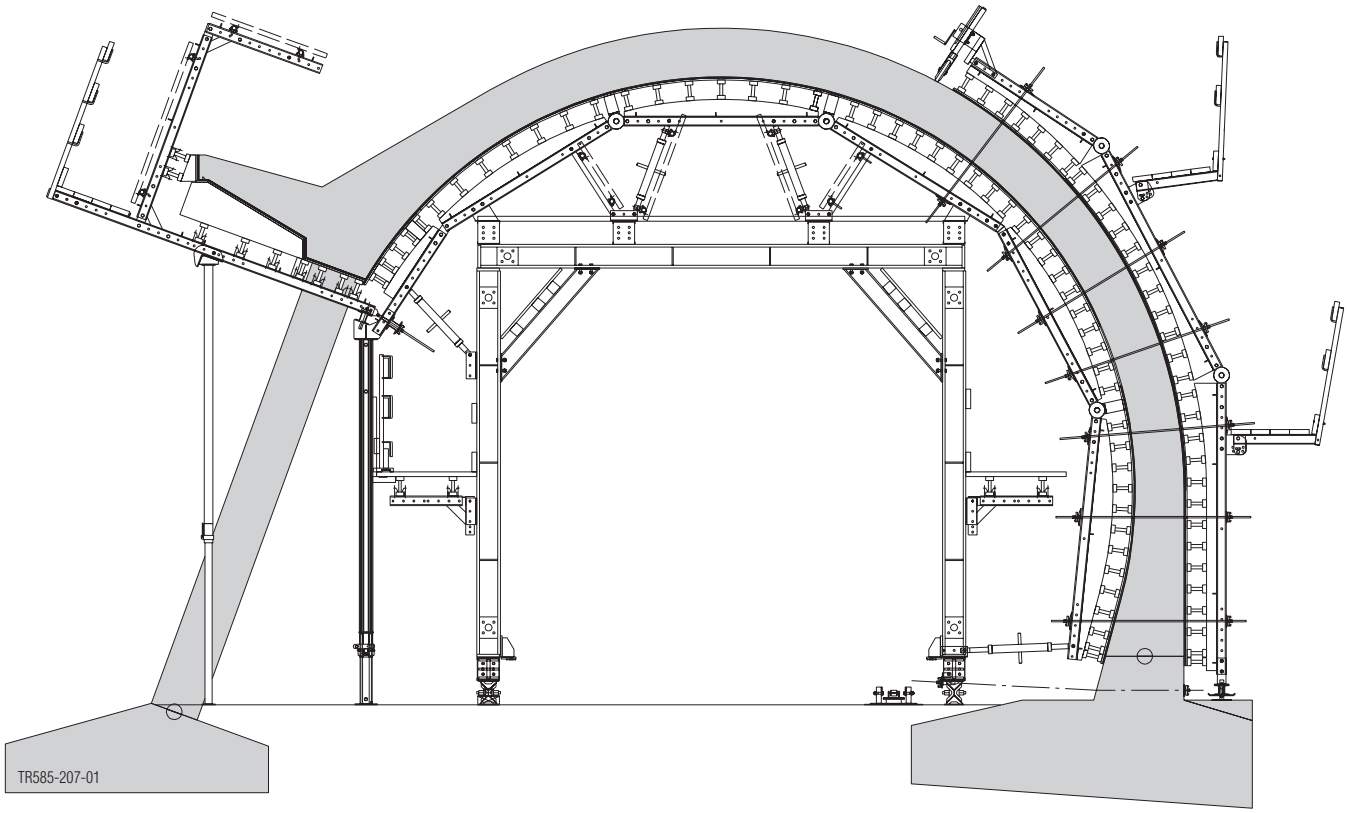
Parallel clamping of multipurpose or steel walings to System beams SL-1

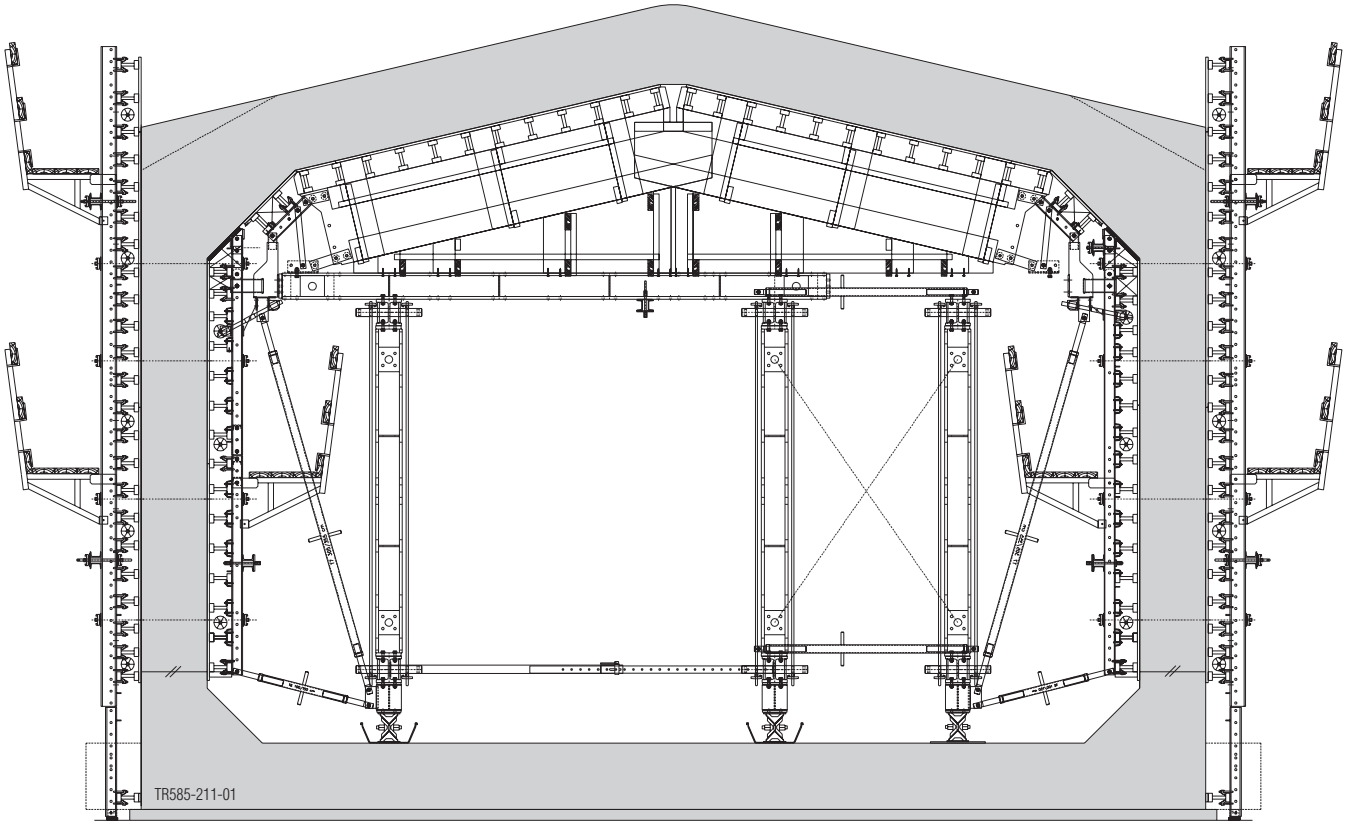


A System beam SL-1
B Multi-purpose waling or Steel waling WS10 Top50
C Beam clamp SL-1

Caution!
➤ The waling may ONLY be clamped parallel to the direction of the system beam.

Examples of the system in action




TR585-211-01

Doka service offerings

Doka "Ready-to-Use" Service

Ready-to-use formworks - for even the most unusual assignments

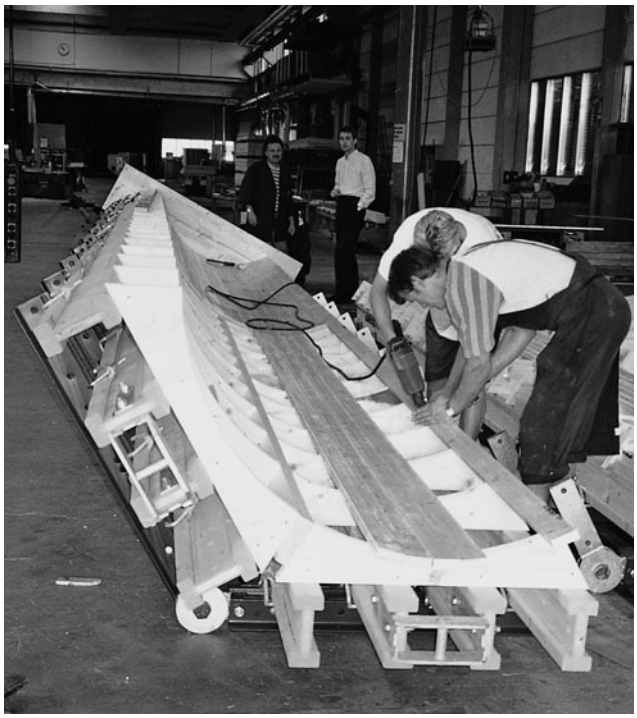
Whatever it is you need to construct from concrete, the Doka Ready-to-Use Service can put together the right formwork for you - quickly, and in guaranteed Doka quality.

No matter whether you are looking for a special concrete finish or a custom solution for a tunnel or bridge.

The professionals from the Doka Ready-to-Use Service plan and make **ready-to-use standard and custom formworks** exactly to your specifications.

By delivering "just-in-time", straight to your site, we **save space** on your site and **reduce the amount of planning and assembly work** that you have to do.

We'll be pleased to inform you about all that the Doka "Ready-to-Use" Service can do for you. Your local/regional Doka branch would also be happy to draw up a tender for your next project.



Doka Reconditioning Service

So that your formwork is in "top form" for its next assignment

Inspecting, cleaning and maintaining your Doka framed formwork - all tasks that the Doka Reconditioning Service will be pleased to take off your hands. Its highly qualified staff and special equipment will quickly get your formwork back in top form - quickly and economically.

The advantage for you: You always have formwork that is **ready for use**, and also **extend the service life** of your equipment.

What's more: It is only with well-maintained formwork that you will achieve the desired quality of concrete surface.

In our modern plants, your formwork will be **carefully cleaned** using energy-saving and environmentally sound technology.

The panels are then inspected for damage and dimensional accuracy and overhauled where necessary. Any damaged form-facing is repaired, or - if necessary - replaced.

Doka customer training

Formwork training pays

Forming operations account for the lion’s share of labour costs on concrete construction sites. Modern formwork equipment helps to rationalise operations. By improving the overall construction sequence at the same time, however, further very worthwhile gains in efficiency can be achieved.

This requires not only better equipment, but also greater skill in making optimum use of this equipment. Doka can help here, with its specialist training programme - to help each and every member of the team do his bit towards boosting efficiency and lowering costs.

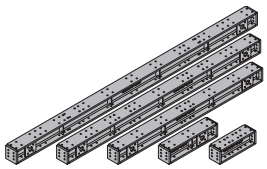
Doka customer training events also look at the formwork equipment and handling methods that are needed in order to achieve optimum safety - knowledge and awareness which can only enhance workplace safety on the site.

You’ll find the Doka training programme well worth looking into.

Your nearest Doka branch will be pleased to tell you more about Doka's various training offerings.

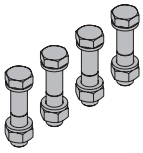
[kg] Article n°

System beam SL-1 5.00m 598.0 582800000
System beam SL-1 4.00m 496.7 582801000
System beam SL-1 3.00m 371.0 582802000
System beam SL-1 1.00m 148.0 582803000
System beam SL-1 0.75m 113.0 582804000
Systemträger SL-1



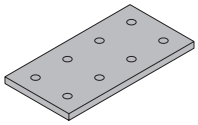
Painted blue
Moment of inertia: 14600 cm⁴
Section modulus: 1200 cm³

Screw set M20x90 8.8 shank length 38mm 1.4 582829000
Schraubensatz M20x90 8.8 Schaftlänge 38mm



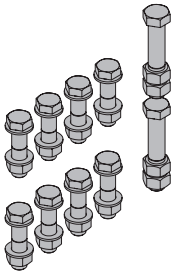
Galvanised
Width-across: 30 mm
Packed in units of 20

Connection splice plate SL-1 14.5 582805000
Stoßlasche SL-1



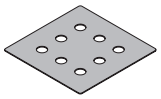
Galvanised
Length: 43 cm
Width: 22 cm

Screw set for connection splice plate SL-1 3.8 582850000
Schraubensatz Stosslasche SL-1



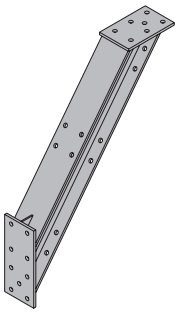
Galvanised
Width-across: 30 mm
Width-across: 32 mm

Packing plate SL-1 2mm 0.69 582864000
Packing plate SL-1 3mm 1.1 582865000
Packing plate SL-1 4mm 1.4 582866000
Futterplatte SL-1



Galvanised
Length: 22 cm
Width: 22 cm

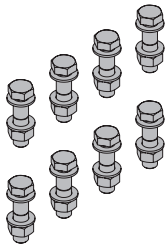
Kneebrace SL-1 79.2 582832000
Kopfband SL-1



Painted blue
Length: 156 cm

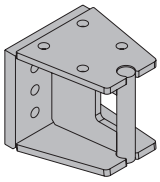
[kg] Article n°

Screw set for kneebrace SL-1 2.8 582856000
Schraubensatz Kopfband SL-1



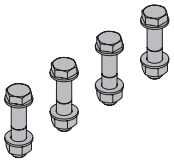
Galvanised
Width-across: 30 mm

Bracket SL-1 25.7 582833000
Konsole SL-1



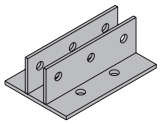
Galvanised
Length: 25 cm
Width: 22 cm
Height: 24 cm

Screw set M22x90 DIN 931 8.8 1.5 582857000
Schraubensatz M22x90 DIN 931 8.8



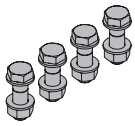
Galvanised
Width-across: 32 mm

Strut connection SL-1 7.0 582806000
Strebenanschluss SL-1



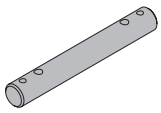
Galvanised
Length: 30 cm
Width: 20 cm
Height: 10 cm

Screw set M20x65 DIN 931 8.8 1.2 582851000
Schraubensatz M20x65 DIN 931 8.8



Galvanised
Width-across: 30 mm

Bracing bolt SL-1 15.6 582807000
Abspannbolzen SL-1



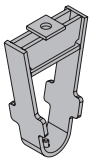
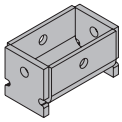
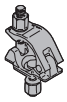
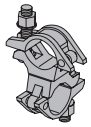
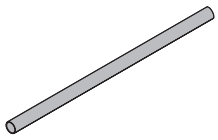
Galvanised
Length: 52 cm
Diameter: 7 cm

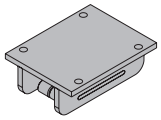
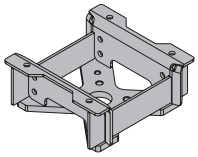
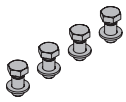
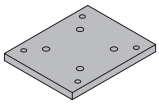
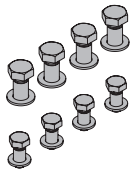
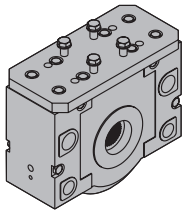
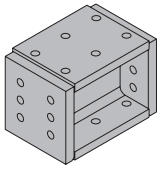
Distance piece SL-1 1.9 582809000
Distanzstück SL-1

Galvanised
Length: 16 cm
Width: 9.2 cm
Height: 8.2 cm

Split nut SL-1 15.0 0.70 582835000
Spannmutter SL-1 15,0

Galvanised
Length: 9-11 cm
Width-across: 30/41 mm

	[kg]	Article n°
Hexagon nut 15.0 Sechskantmutter 15,0  Galvanised Length: 5 cm Width-across: 30 mm Packed in units of 150 Perm. capacity with safety factor of 1.6: 120 kN Perm. capacity to DIN 18216: 90 kN Breaking load: > rod breaking load (> 195 kN)	**0.23**	**581964000**
Brace stirrup SL-1 Abspannbügel SL-1  Galvanised Height: 33.4 cm	**6.4**	**582862000**
Fixing bracket SL-1 Spannkonsole SL-1  Galvanised Length: 22 cm Width: 13 cm Height: 12 cm	**7.5**	**582849000**
Screw set for fixing bracket SL-1 Schraubensatz Spannkonsole SL-1  Galvanised Width-across: 30 mm	**0.003**	**582861000**
Screw-on coupler 48mm 50 Anschraubkupplung 48mm 50  Galvanised Width-across: 22 mm	**0.84**	**682002000**
Swivel coupler 48mm Drehkupplung 48mm  Galvanised Width-across: 22 mm	**1.5**	**582560000**
Scaffold tube 48.3mm 1.00m	**4.0**	**682014000**
Scaffold tube 48.3mm 1.50m	**6.0**	**682015000**
Scaffold tube 48.3mm 2.00m	**8.0**	**682016000**
Scaffold tube 48.3mm 2.50m	**10.0**	**682017000**
Scaffold tube 48.3mm 3.00m	**12.0**	**682018000**
Scaffold tube 48.3mm 3.50m	**14.0**	**682019000**
Scaffold tube 48.3mm 4.00m	**16.0**	**682021000**
Scaffold tube 48.3mm 4.50m	**18.0**	**682022000**
Scaffold tube 48.3mm 5.00m	**20.0**	**682023000**
Scaffold tube 48.3mm 5.50m	**22.0**	**682024000**
Scaffold tube 48.3mm 6.00m	**24.0**	**682025000**
Scaffold tube 48.3mm .....m Gerüströhr 48,3mm  Galvanised	**4.0**	**682001000**

	[kg]	Article n°
Heavy duty roller gear SL-1 300kN Wälzwagen SL-1 300kN  Painted blue Length: 27 cm Width: 21 cm Height: 11 cm Max. load: 30000 kg Follow the directions in the "Operating Instructions"!	**18.3**	**582818000**
Guidance for heavy duty roller gear SL-1 Wälzwagenführung SL-1  Galvanised Length: 39 cm Width: 38 cm Height: 16 cm	**22.1**	**582834000**
Screw set guid. f. heavy duty roller g. SL-1 Schraubensatz Wälzwagenführung SL-1  Galvanised Width-across: 24 mm	**0.004**	**582858000**
Inner plate SL-1 Zwischenplatte SL-1  Galvanised Length: 27 cm Width: 22 cm Height: 2 cm	**8.9**	**582830000**
Screw set for inner plate SL-1 Schraubensatz Zwischenplatte SL-1  Galvanised Width-across: 30 mm Width-across: 24 mm	**1.1**	**582855000**
Flanged wheel SL-1 220kN Spurkranzrad SL-1 220kN  Length: 47 cm Width: 22 cm Height: 40 cm	**139.3**	**582890000**
Roller SL-1 D 200x50 Rolle SL-1 D 200x50  Galvanised	**9.5**	**582823000**
Travelling gear distancer SL-1 330mm Fahrwerkdistanz SL-1 330mm  Galvanised Length: 33 cm Width: 22 cm Height: 24 cm	**53.0**	**582863000**

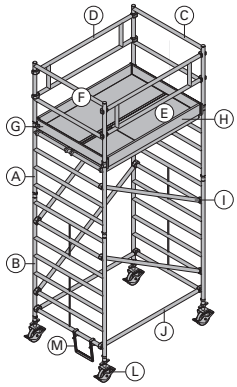
	[kg]	Article n°
Lowering wedge SL-1 420kN Absenkkeil SL-1 420kN Galvanised Height: 16.8 - 26.8 cm	**30.0**	**582821000**
Lowering zylinder SL-1 250kN Absenkzylinder SL-1 250kN Painted blue Height: 28-56 cm Max. load: 25000 kg Follow the directions in the "Operating Instructions"!	**27.2**	**582870000**
Driving hydraulic unit SL-1 Antriebs-Hydraulikaggregat SL-1 Length: 100 cm Width: 74 cm Height: 140 cm Follow the directions in the "Operating Instructions"! CE	**430.0**	**582848000**
Hydraulic drive SL-1 Hydraulikantrieb SL-1 Painted blue Length: 44 cm Follow the directions in the "Operating Instructions"! CE	**87.0**	**582828000**
Involute gearing KF SL-1 Vielzahnwelle KF SL-1 Length: 11.5 cm	**2.0**	**582889000**
Connection set for flanged wheel SL-1 Anschlussset Spurkranzrad SL-1	**54.0**	**582891000**
Hydraulic unit for forming operations Hydraulikaggregat für Schalvorgänge Painted blue Length: 112 cm Width: 80 cm Height: 183 cm Follow the directions in the "Operating Instructions"! CE	**742.0**	**580811000**

	[kg]	Article n°
Hydraulic distributor Hydraulikverteiler	**23.0**	**580808000**
Spindle strut SL-1 T16 100/140cm **Spindle strut SL-1 T16 140/225cm** **Spindle strut SL-1 T16 170/275cm** **Spindle strut SL-1 T16 220/375cm** Spindelstrebe SL-1 Galvanised	**54.1** **87.8** **101.7** **123.0**	**582871000** **582872000** **582873000** **582874000**
Strut connection SL-1 T16 Strebenanschluss SL-1 T16 Galvanised Length: 26 cm Width: 20 cm Height: 13 cm	**10.4**	**582887000**
Lowering shoe SL-1 Absenkschuh SL-1 Galvanised Length: 28 cm Height: 17 cm	**18.0**	**582884000**
Multi-purpose waling SL-1 WU16 0.625m **Multi-purpose waling SL-1 WU16 0.75m** **Multi-purpose waling SL-1 WU16 1.00m** **Multi-purpose waling SL-1 WU16 1.25m** **Multi-purpose waling SL-1 WU16 1.50m** **Multi-purpose waling SL-1 WU16 1.75m** **Multi-purpose waling SL-1 WU16 2.00m** **Multi-purpose waling SL-1 WU16 2.25m** **Multi-purpose waling SL-1 WU16 2.50m** **Multi-purpose waling SL-1 WU16 3.00m** Mehrzweckriegel SL-1 Painted blue Space between flange profiles: 5.3 cm Moment of inertia: 1850 cm^4 Section modulus: 232.0 cm^3	**24.0** **29.0** **40.0** **48.0** **58.0** **67.0** **72.1** **86.0** **89.9** **107.0**	**582875000** **582876000** **582877000** **582878000** **582879000** **582880000** **582881000** **582882000** **582883000** **582888000**
Connecting pin SL-1 D32 100 Verbindungsbolzen SL-1 D32 100 Galvanised Length: 17 cm	**1.0**	**582885000**

	[kg]	Article n°
Spring cotter 6mm Federvorstecker 6mm Galvanised Length: 13 cm Packed in units of 250	**0.06**	**580204000**
Waling connector SL-1 WU16 0.75m Riegelverbinder SL-1 WU16 0,75m Galvanised Length: 75 cm	**31.0**	**582886000**
Angle tie bracket 20,0 SL-1 WU16 Winkelspanner 20,0 SL-1 WU16 Painted blue Length: 24 cm	**8.1**	**587543000**
Prop spindle SL-1 Stützenspindel SL-1 Galvanised Length: 37 cm Width: 37 cm Height: 44.5-66.5 cm	**81.0**	**582816000**
Strut SL-1 2.50m	**86.5**	**582812000**
Strut SL-1 1.25m	**60.5**	**582813000**
Strut SL-1 0.625m	**40.0**	**582814000**
Strut SL-1 0.312m	**27.0**	**582815000**
Strut SL-1 0.156m Stütze SL-1 Galvanised Width: 37 cm	**16.0**	**582817000**
Screw set M16x40 DIN 933 8.8 Schraubensatz M16x40 DIN 933 8.8 Galvanised Width-across: 24 mm	**0.56**	**582831000**
Basic plate SL-1 Grundplatte SL-1 Galvanised Length: 37 cm Width: 37 cm	**30.3**	**582808000**
Screw set for basic plate SL-1 Schraubensatz Grundplatte SL-1 Galvanised	**1.2**	**582852000**

	[kg]	Article n°
Connection adapter SL-1 Anschlussadapter SL-1 Galvanised Length: 35 cm Width-across: 22 mm	**4.3**	**582810000**
Beam clamp SL-1 Trägerklemme SL-1 Galvanised Height: 17 cm Width-across: 24 mm	**1.7**	**582824000**
Tool box SL-1 Werkzeugbox SL-1 included in scope of supply:	**19.9**	**582836000**
(A) **Combination wrench 19** 2 pcs.	**0.14**	**582837000**
(B) **Combination wrench 22** 2 pcs.	**0.20**	**582838000**
(C) **Combination wrench 24** 2 pcs.	**0.25**	**582839000**
(D) **Combination wrench 30** 2 pcs.	**0.43**	**582840000**
(E) **Combination wrench 32**	**0.75**	**582859000**
(F) **Combination wrench 36**	**0.75**	**582860000**
(G) **Combination wrench 41**	**1.5**	**582841000**
(H) **Ratcher-ring wrench 30/32**	**1.3**	**582843000**
(I) **Nut for box spanner 19**	**0.16**	**580598000**
(J) **Nut for box spanner 22**	**0.22**	**582844000**
(K) **Nut for box spanner 24**	**0.25**	**582845000**
(L) **Nut for box spanner 30**	**0.52**	**582846000**
(M) **Extension 20cm 3/4"**	**0.68**	**580683000**
(N) **Reversible ratchet 3/4"** Galvanised Length: 50 cm	**1.5**	**580894000**
(O) **Tie rod wrench 15.0/20.0** Galvanised Length: 37 cm Diameter: 8 cm	**1.9**	**580594000**
(P) **Transition piece A 1/2"x3/4"**	**0.18**	**580684000**
(Q) **Angular arbor SL-1**	**1.4**	**582867000**
(R) **Fork wrench 46**	**0.87**	**582869000**
(S) **Ring spanner 46**	**0.96**	**582868000**

	[kg]	Article n°
Doka mobile scaffold tower Z		
Doka-Fahrgerüst Z		
consisting of:		
(A) **Attachable frame Z 1.00m**	**6.7**	**586016000**
(B) **Attachable frame Z 2.00m**	**11.3**	**586017000**
(C) **Railing frame Z 1.00m**	**4.1**	**586021000**
(D) **Handrail post Z 1.80m**	**6.5**	**586022000**
(E) **Platform Z with manhole flap 1.80m**	**17.5**	**586023000**
(F) **Platform Z without manhole flap 1.80m**	**17.0**	**586024000**
(G) **Cross board Z 1.35m**	**4.0**	**586025000**
(H) **Longitudinal board Z 1.80m**	**5.1**	**586026000**
(I) **Diagonal brace Z 2.00m**	**3.0**	**586027000**
(J) **Horizontal brace Z 1.80m**	**2.8**	**586028000**
(K) **Triangular bracket Z**	**5.3**	**586029000**
(not illustrated)		
(L) **Guide roller Z D200mm**	**7.1**	**586030000**
(M) **Entrance step bow Z**	**2.5**	**586031000**
(N) **Platform diagonal strut Z**	**2.5**	**586032000**
(not illustrated)		
(O) **Ballast Z**	**10.0**	**586033000**
(not illustrated)		

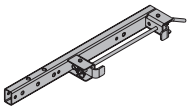


Aluminium

Follow the directions in the "Instructions for assembly and use"!

Ladder system XS

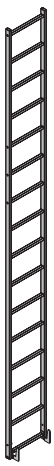
Connector XS DM/SL-1 — **11.7** — **588672000**
Anschluss XS DM/SL-1



Galvanised

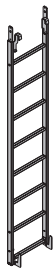
Length: 100 cm

System ladder XS 4.40m — **33.2** — **588640000**
System-Leiter XS 4,40m



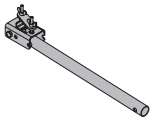
Galvanised

Ladder extension XS 2.30m — **19.1** — **588641000**
Leiternverlängerung XS 2,30m



Galvanised

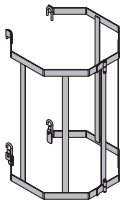
Securing barrier XS — **4.9** — **588669000**
Sicherungsschranke XS



Galvanised

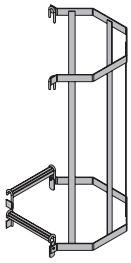
Length: 80 cm

Ladder cage XS 1.00m — **16.5** — **588643000**
Rückenschutz XS 1,00m



Galvanised

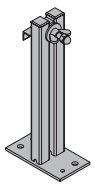
Ladder cage exit XS — **17.0** — **588666000**
Rückenschutz-Ausstieg XS



Galvanised

Height: 132 cm

Ladder adapter XS — **5.0** — **588673000**
Leiternfuß XS



Galvanised

Height: 50 cm

[kg]	Article n°

[kg]	Article n°

Doka heavy-duty supporting system SL-1 - the safe way of transferring heavy loads

The Heavy-duty supporting system SL-1 from Doka can be efficiently adapted to any shape and load.
Its high load-bearing capacity and fast, cost-saving mode of assembly
make this heavy-duty supporting system extremely efficient and economical.
All components of the system can be rented, so it is a great solution for shorter-duration sites as well.
The Doka heavy-duty supporting system SL-1 is available for rental, leasing or purchase.
At any of the Doka branches in your region.
Why not give us a call?

The Doka Group's central plant at Amstetten, Austria

Certified to ISO 9001

Doka international

Österreichische Doka Schalungstechnik GmbH
Josef Umdasch Platz 1, A 3300 Amstetten, Austria
Tel.: +43 (0)7472 605-0, Fax: +43 (0)7472 64430
E-Mail: Oest.Doka@doka.com
Internet: www.doka.com

Brazil
Doka Brasil
Fôrmas para Concreto Ltda.
Rua Guilherme Lino dos Santos, 800
Jardim Flôr do Campo -
Guarulhos/SP CEP 07.190-010
Telephone: +55 (0)116404-3500
Telefax: +55 0)116404-5700
E-Mail: Brasil@doka.com

Canada
Doka Canada Ltd.
5404 - 36th Street S.E.
Calgary AB T2C 1P1
Telephone: +1 403 243 66 29
Telefax: +1 403 243 67 87
E-Mail: Canada@doka.com

China
Doka Shanghai Cons. Co., Ltd.
28F NO. 726 Yan an Xi Road
Shanghai 200050
Telephone: +86 21 52370790
Telefax: +86 21 52370796
E-Mail: China@doka.com

Finland
Doka Finland Oy
Selintie 542
FIN 03320 Selki
Telephone: +358 (0)92242640
Telefax: +358 (0)9 22426420
E-Mail: Finland@doka.com

Greece
Doka Hellas
Kaloupotechniki Technologiki A.E.
Agiou Athanasiou 5
GR 153 51 Pallini / Attiki
Telephone: +30 210 6669211
Telefax: +30 210 6032614
E-Mail: Hellas@doka.com

Ireland
Doka Ireland Formwork Techn. Ltd.
Monasterboice, Drogheda
County Louth
Telephone: +353 (0)41 686 1620
Telefax: +353 (0)41 686 1525
E-Mail: Ireland@doka.com

Italy
Doka Italia S.p.A.
Strada Provinciale Cerca, 23
I-20060 Colturano MI
Telephone: +39 0298 27 6.1
Telefax: +39 0298 23 75 77
E-Mail: Italia@doka.com

Kuwait
Doka Kuwait
Div. of Riham Gen. Trad.& Cont. Co.
P.O. Box 2217 Salmiyah
22023 Kuwait
Telephone: + 965 482 24 62
Telefax: +965 482 24 72
E-Mail: Kuwait@doka.com

Lebanon
Österreichische Doka
Schalungstechnik GmbH
Doka Branch Lebanon
Sodeco Square, Block C / 9th floor
Beirut/Lebanon
Telephone: +961 (0)1 612569
Telefax: +961 (0)1 612570
E-Mail: Lebanon@doka.com

Norway
Doka Norge AS
Heggstadmoen 4
N 7080 Heimdal
Telephone: +47 72 89 38 10
Telefax:n +47 72 89 38 11
E-Mail: Norge@doka.com

Portugal
Doka Portugal Cofragens Lda.
Estrada Real, n 41 - Recta da Granja
Santa Maria e S. Miguel
P 2710-450 Sintra
Telephone: +351 21 911 26 60
Telefax: +351 21 911 20 11
E-Mail: Portgual@doka.com

Qatar
Doka Qatar WLL
P.O.Box 23439
Doha, Qatar
Telephone: +974 4500628
Telefax: +974 4500608
E-Mail: Qatar@doka.com

Saudi Arabia
Doka Formwork Technology
Div. of Mahmoud Othman Est.
P.O. Box 7620
Jeddah 21472
Telephone: +966 0)2669 10 08
Telefax: +966 (0)2664 86 25
E-Mail: Jeddah@doka.com

South Africa
Doka South Africa
Cape Town Branch
P.O. Box 305
7579 Kuilsriver, Cape Town
Telephone: +27 (0)21905 3295
Telefax: +27 (0)21 905 4745
E-Mail: South-Africa@doka.com

Spain
Doka España Encofrados, S.A.
Polígono Industrial Aimayr
Calle Acero 4 y 13
28330 San Martín de la Vega (Madrid)
Telephone: +34 91 685 75 00
Telefax: +34 91685 75 01
E-Mail: Espana@doka.com

Sweden
Doka Sverige AB
Kurödsvägen 20
S 451 55 Uddevalla
Telephone: +46 (0)522 65 66 30
Telefax: +46 (0)522 65 66 39
E-Mail: Sverige@doka.com

Turkey
Doka Kalip-Iskele
Sanayi ve Ticaret A.S.
Baris Mahallesi, Dr.Zeki Acar Cad.10
TR 41400 Gebze, Kocaeli
Telephone: +90 262 642 02 65
Telefax: +90 262 642 82 99
E-Mail: Turkiye@doka.com

United Arab Emirates
Doka Gulf FZE
P.O. Box 61407
Jebel Ali Free Zone, Dubai
Telephone: +971 (0)4 881 8096
Telefax: +971 (0)4 881 8097
E-Mail: Emirates@doka.com

United Kingdom
Doka UK
Formwork Technologies Ltd
Monchelsea Farm, Heath Road
Boughton Monchelsea
Maidstone, Kent, ME17 4JD
Telephone: +44 (0)1622 74 90 50
Telefax: +44 (0)1622 74 90 33
E-Mail UK@doka.com

USA
Doka USA, Ltd.
214 Gates Road
Little Ferry, NJ 07643
Telephone: +1 201 329-7839
Telefax: +1 201 641-6254
E-Mail: usa@doka.com
Internet: www.dokausa.com

Other subsidiaries and representatives:

Algeria
Bahrain
Belgium
Belorus
Bulgaria
Chile
China
Croatia
Czech Republic
Denmark
Estonia
France
Germany
Guatemala
Hungary
Iceland
India
Iran
Japan
Jordan
Kazakhstan
Korea
Latvia
Lithuania
Libya
Luxembourg
Marocco
Mexico
Netherlands
New Zealand
Panama
Poland
Romania
Russia
Senegal
Serbia
Singapore
Slovakia
Slovenia
Switzerland
Taiwan
Thailand
Tunisia
Ukraine
Vietnam

doka
The Formwork Experts

999759002 - 06/2008 Ü